Research Note 85-62

ENHANCEMENTS TO MOTIVATIONAL SKILLS TRAINING FOR MILITARY TECHNICAL TRAINING STUDENTS: PHASE II EVALUATION

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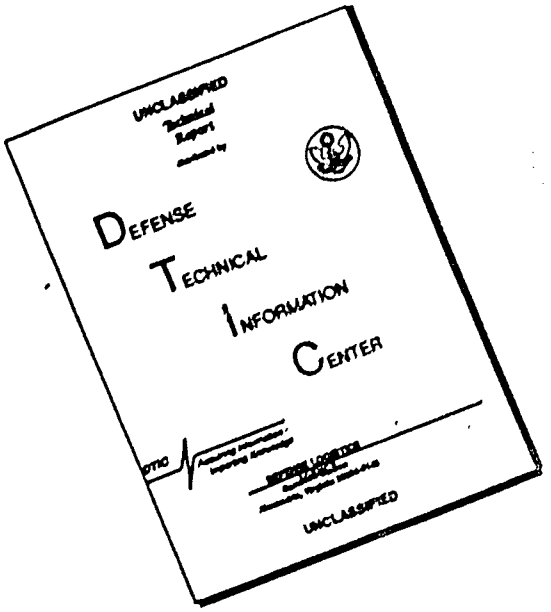

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Dr. Richard P. Kern, contracting officer's representative and technical monitor for this project. This research, reported in two volumes, is one of five learning strategy research projects performed under the research component of the Basic Skills Resource Center contract.

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This research note is a part of the Basic Skills Resource Center research component, and was undertaken to design and evaluate the effectiveness of Computer Assisted Instruction (CAI) enhanced versions of the Motivational Skills Training Program. This report describes the technology-based CAI enhancements, and the results of an experimental examination of the skills training program. Recommendations for implementation in Army Technical programs are also discussed. (See also Phase I Evaluation, RN 85-61.)

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FOREWORD

The Instructional Technology Systems Technical Area of the U.S. Army Research Institute for the Behavioral and Social Sciences directs research in learning strategies applications with a special focus on educational technology and links to military education and training. These research and development efforts are aimed at the overall improvement of the Army's Basic Skills Education Program.

This research effort included the design and development of CAI enhancements for the Motivational Skills Training Program. This report describes the results of an evaluation of the effectiveness of the technology-based instruction and identifies recommendations for implementation of the training program within Army technical training efforts. Overall, this effort was undertaken to explore procedures to remedy motivational deficiencies related to unsatisfactory performance in military technical training and to determine if microcomputer-based instruction might be used to offset or reduce instructor requirements associated with motivational training.

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Problem

A skills training program for remedying motivational deficiencies related to unsatisfactory performance in military technical training has been found to improve the subsequent test scores, test failure rates, and/or eliminations from technical training in two prior studies conducted with Air Force trainees. In these studies, the seven printed, self-instructional modules of the Motivational Skills Training Program were augmented by instructor introductions and small group discussion and practice sessions. Results of the second study, conducted as the first phase of this project for the Army Research Institute, indicated that the inclusion of instructor introductions and group practice sessions for each module contributed to the effectiveness of the motivational program. Of additional interest to the Army, however, is the question of whether microcomputer-based technologies might be used to offset or reduce instructor and group requirements for this motivational training, thereby increasing the practical utility of this training for large scale implementation within Army technical training.

Purpose

This is the second of two technical reports describing activities in the two phases of this project, respectively. The goals of Phase I were to determine the separate contribution of instructor augmentation and group experiences to motivational program effectiveness and to identify specific computer-assisted instruction (CAI) enhancements for those training components which benefited from instructor augmentation and group experiences. The goals of Phase II were to design and evaluate the effectiveness of CAI enhanced versions of the Motivational Skills Training Program and to make recommendations for future

implementations of the program within Army technical training. This report describes the design of CAI enhancements and the results of an experimental study directed at accomplishing Phase II goals.

Approach

A simple computer-controlled audio capability which interfaces with the Apple IIe microcomputer was developed to achieve the personalization desired in the simulation of instructor and group functions. The character "PC," created to simulate instructor functions, was designed to enact three primary roles: facilitator, modeler, and motivator. To provide the identified group functions of peer identification, opportunities for shared problem solving, and peer modeling and feedback, a set of military characters was defined. The characters were designed to "grow" as a result of their skill training from an initial inability to solve particular problems to competent problem solvers and self-managers. This transition occurred between PC's guided CAI introductions and CAI practice sessions for each module. Much of the modeling provided in the CAI segments is accomplished via the computer-contolled audio capability, while most of the actual skill practice is provided through the CAI exercises. The contractor-developed audio interface consists of a specially designed interface card which plugs into the Apple IIe game I/O port. This capability allows for computer control of a linear sequence of audio messsages that coincide with particular CAI frame sequences, as well as provides for the personalization of skill training introductions and practices, at about one-eighth the cost of videodisc technology.

The design for the experimental study consisted of six conditions: an historical control group (HC), a current control group (CC), a CAI introduction and practice group (CAI), a CAI introduction and instructor practice group

(CAII), an instructor introduction and CAI practice group (ICAI), and an instructor introduction and practice group (II). Participants in the study were male and female students scheduled to begin the Electronic Communications (EC) course at Ft. Sill, Oklahoma, during the period of 25 October 1983 through 17 February 1984. At the conclusion of the study, data on a total of 532 students were available for analysis. The number of students in each condition was as follows: 53 in the HC condition, 253 in the CC condition, 55 in the CAI condition, 61 in the CAII condition, 53 in the ICAI condition, and 57 in the II condition. Data available for analysis included (a) pretreatment student differences by condition in ASVAB scores, Army component, sex, initial critical thinking skills, initial judgments of self-efficacy, and initial indices of anxiety and ability to cope with stress; and (b) posttreatment differences critical thinking skills, judgments of self-efficacy, indices of anxiety and ability to cope with stress, instructor ratings of students' self-management skills, times to complete the first and second EC course segments, test failures in the first and second EC course segments, progress indices for the entire EC course, and whether students attrited or graduated.

Findings

Study results indicate that students who received the motivational skills training with instructor introductions/group practice sessions (II condition) performed better during subsequent EC course technical training than either students who received no motivational skills training (CC condition) or students who received the motivational skills training via CAI with no instructor practice (CAI and ICAI conditions). This better performance was manifested in terms of both significantly fewer test failures and less training time. In addition, as compared to the CC condition, students receiving either the CAI or II conditions

tended to have lower attrition rates. Although these differences were not statistically significant, the 8.2 percent reduction for the CAI condition and the 4.4 percent reduction for the II condition may have some practical significance in terms of training costs. For similar students going through the EC course a year earlier (the HC condition) attrition rates were 5.2 percent higher than for students in the current study and progress indices were approximately 12 percent higher. The higher attrition and progress index rates for the HC as compared with current groups was at least in part a function of new procedures being implemented in the student battery (housing area) to improve the performance of students not progressing through the EC course at a satisfactory rate. Thus, it is likely that findings with the Motivational Skills Training Program were attenuated in the present study.

Since study findings indicated no overall superiority of the CAI vs. II conditions, some exploratory analyses of potential individual dfferences in subsequent student performance as a function of treatment condition were conducted. These analyses generally indicated that the CAI condition is at least equally effective for approximately half of the students (i.e., those students of high general ASVAB ability and those students with low perception of competence or self-esteem). These findings imply that there may be systematic and reliable individual differences that could be used in differential treatment format assignments, thereby reducing some of the instructor support requirements for the motivational program as well as capitalizing on the use of microcomputer technology for this type of skill training.

In general, the Motivational Skills Training Program appears to have achieved the goal of providing needed and relevant training and to have

contributed to improvements in students' subsequent technical training performance. The Phase II evaluation findings also generally support Phase I evaluation findings, i.e., they substantiate the importance of instructor and group experiences for this type of skills training at least for some types of students. Additional research issues to be explored, however, include (a) an analysis of what is learned in the motivational program, a development of well defined measures of the identified knowledges and skills, and an exploration of relationships between these measures of what is learned and subsequent student performance; (b) investigations of individual differences predictive of what types of students need the motivation program and of those who would most benefit from this training, investigations of individual differences predictive of CAI vs. instructor/group versions of the training; and (c) an analysis, identification, and evaluation of a set of skill maintenance strategies that can operate within the total context of an individualized Motivational Skills Training Program.

Introduction

Background

Not only have many students entering military technical training been shown to have deficiencies in basic reading skills, study skills, and cognitive learning strategies, but they have also been shown to demonstrate skill deficiencies of an attitudinal or motivational nature (McCombs, 1982; McCombs & Dobrovolny, 1980, 1982). These motivational skill deficiencies are generally reflected in trainees' inability to positively adjust to the requirements of military technical training and to implement necessary self-management, personal responsibility, and positive self-control strategies that are related to self-motivation (McCombs, 1984). More specifically, motivational skill deficiencies related to unsatisfactory performance in technical training have been found to include insufficient goal setting and problem solving skills, inadequate self-evaluation and planning skills, inappropriate approaches or strategies for dealing with anxiety and stress, and ineffective communication skills (McCombs, 1982).

A program for remedying these motivational deficiencies, entitled the Motivational Skills Training Program, was developed by McCombs and Dobrovolny (1982) and evaluated with Air Force trainees. The program includes seven self-instructional, printed modules that have been implemented in an instructor-led, small-group format which provides trainees with the opportunity to practice new strategies and skills, share experiences, and develop feelings of rapport with their instructors and fellow trainees. The evaluation of this program of self-instructional materials augmented by instructor support and group experiences in the Air Force's Precision Measuring Equipment (PME) course

indicated that trainees liked the program and found it helpful in their course work and personal lives. Further, trainees participating in the program had significantly higher block test scores and lower test failure rates than control group trainees (McCombs & Dobrovolny, 1982).

Although the evaluation findings with the Motivational Skills Training Program pointed to its success, several research questions remained. One set of questions concerned the separate contributions of instructor augmentation and group experiences to the effectiveness of the program, and their implications for the identification of motivational skills training components that could be enhanced by the use of a computer-assisted instruction (CAI) format. A second set of questions concerned the issue of the format of this training and whether the cost effectiveness of the program could be enhanced by reducing instructor and/or group interaction requirements through the use of CAI for selected portions of the training. These questions were addressed in the present research, undertaken by the Army Research Institute. The first set of questions was addressed in a report describing the first phase of this project (McCombs, Bruce, & Lockhart, in press). This report addresses the second set of questions and describes the results of Phase II activities.

Phase I Evaluation Findings

Activities in Phase I of this project included an experimental study which explored the relative effectiveness of the printed modules under conditions of varying instructor and group augmentation, and a contractor analysis of instructor and group functions which facilitated student acquisition of concepts and skills in the motivational program. The integration of findings from both of these activities led to the specification of general strategies and procedures for CAI

components to be developed that could simulate the identified instructor and group functions.

The Phase I experimental study was conducted with a total of 120 Air Force trainees scheduled to enter the Weapons and Armament School at Lowry Air Force Base. These students were assigned to one of four conditions following their arrival on base: a printed modules only condition, a modules plus instructor introductions condition, a modules plus instructor introductions and group discussions condition, and a no training control condition.

Primary findings from this study were that experimental students who received instructor introductions to each module or instructor introductions and group practices had lower elimination rates once they entered their technical training course than students who received no motivational training (control) or printed modules only. In addition, test failure rates were lowest for students who received the motivational skills training with both instructor introductions and group practices, as compared with other experimental and control conditions. These findings suggested that instructor and group experiences enhance the subsequent effectiveness of the Motivational Skills Training Program, with implications for student performance and attrition in technical training (McCombs et al., in press).

The contractor analysis of instructor roles in the motivational training led to the definition of three primary roles that could be provided by the computer: modeler, motivator, and facilitator. A character named "PC" was defined to personalize and enact these roles. The analysis of the roles and functions of the group experiences indicated that facilitative functions included peer identification, opportunities for shared problem solving, and peer modeling

and feedback. A set of military characters was defined to personalize these group functions and represent specific personal responsibility and self-control problems related to each module's content area. The CAI development guidelines specified the use of PC and the set of military characters in CAI introductions to the program and each module and in CAI practice sessions at the end of each module. It was determined that introductory segments would be approximately 10 minutes each and the practice segments would be approximately 15 minutes each, for a total of about 2½ hours of CAI (McCombs et al, in press).

Findings from both the experimental study and contractor analysis suggested the importance of personalization and the need for simulation of instructor and group functions within a "rich" training medium. For students to identify with and sense the human qualities of the defined instructor and group characters, both interactive visual and audio capabilities appear necessary. To provide these capabilities within the cost constraints and practicalities of this project, McCombs et al. (in press) recommended that a simple computer-controlled audio capability for the Apple IIe system be developed in Phase II of the project.

Nature of this Research

The goals of this second phase of the present project were to design and evaluate the effectiveness of CAI enhanced versions of the Motivational Skills Training Program and to make recommendations for future implementations of the program within Army technical training. The selection of motivational program components for CAI design and development was based to a large extent on the analysis of Phase I evaluation data, as presented in the McCombs, et al. (in press) report and summarized in the preceding section. This report, therefore,

summarizes activities related to the design, development, and evaluation of the motivational program components selected for implementation in a CAI format.

Relevant Literature

The literature selectively reviewed in this section is intended to supplement the literature on the role of instructors and the group process in motivational skills training presented in the McCombs et al. (in press) report on Phase I evaluation findings. This literature covers both potential enhancements that can be provided by a CAI format and suggested design strategies that can be incorporated in the CAI components.

In discussing the use of media such as CAI for the enhancement or replacement of conventional instructional media such as instructors or group instruction, Clark (1983, 1984) makes the cogent point that it is not the media per se that influence learning. Rather, it is the content and method of instruction that are critical and the medium is merely an alternative delivery vehicle. Clark argues that in using the medium of computers, one must focus on available instructional theory in finding the necessary instructional methods for fostering the desired learning outcome. He also points out that decisions to use computers are more a matter of implementation issues such as cost, practicality, resources, and equity of access and that this medium can be maximized to address particular implementation problems by focusing on the computer's special features (Clark, 1984). For the goals of this particular project, therefore, it is important to keep in mind that in using CAI to simulate critical instructor or group process functions, special delivery features must be carefully matched to content and function requirements.

Some general instructional features of CAI that have been shown to be potentially useful to students who have responded poorly to traditional

instructional methods include individualization, mastery learning, and self-pacing (Cross, 1976). More recent research with these instructional features, particularly the mastery learning model, however, has raised some question about the effectiveness of these features for the disadvantaged background, low ability student (Covington & Omelich, 1981; Federico, 1981; Stinard & Dolphin, 1981; Thompson, 1980). A question raised by Covington and Omelich (1981) is whether or not instructional features which include repeated test trials and grading against absolute standards perpetuate a negative failure cycle for low ability/low self-confidence students. Recognition of this possibility in utilizing CAI technology, therefore, is an important consideration in making optimum use of this medium with military student populations.

On the more practical side, however, Siegel and Simutis (1979) point out that within the Army there are many problems associated with providing basic skills training to the large number of individuals at many different locations needing this training. These problems include inconsistent quality in the content of basic skills courses, inconvenience of the training times for many soldiers, inappropriate matches of skill levels and basic skills curriculum, and difficulties in handling the large amount of paperwork involved in a basic skills training program. Problems such as these have led the Army Research Institute (ARI) to explore the use of CAI for basic skills training in the Army. The advantages seen in this instructional medium are the opportunities to provide standardized, efficient, and individualized training. In initial studies to evaluate CAI for various types of skills training, Siegel and Simutis (1979) report that CAI was at least as effective as traditional instruction, particularly if instructors are given the opportunity to become comfortable with the new technology and are given training in the roles required by the new technology.

An issue of concern in the implementation of CAI with a skills training curriculum, then, is the role instructors play in the learning process. Regardless of whether the entire curriculum is presented via CAI or whether segments of CAI are embedded within an off-line program, the instructor's role is key to the success of the program. At a minimum, Burns and Davisson (1979) suggest that instructors have input into how CAI is used and be given short inservice workshops wherein CAI applications are explained and demonstrated. Others have made similar points and have particularly stressed the importance of involving instructors in the design and implementation of CAI as well as providing them meaningful role training (e.g., Bloom, 1984; McCombs & Dobrovolny, 1980, 1982; McCombs, Dobrovolny, & Lockhart, 1983; Stasz, Winkler, Shavelson, Robyn, & Feibel, 1984; Swing & Peterson, 1981).

Jernstedt (1983) has argued that a problem in the implementation of individualized instruction and computer technologies is that they have been used as replacements for teachers and for group learning. He cites evidence that (a) teachers have a profound impact on students' cognitive and affective development and (b) peer group interactions impact academic achievement, cognitive problem solving skills, and intellectual self-esteem. The need for successful combinations of interpersonal relations and computer technologies is stressed. Jernstedt (1983) thinks we now know enough to define the functional purpose of the interpersonal and computer roles and to arrive at a synergetic combination. Interpersonal or human functions seen as important include a focus on peer relationships and cooperative goals, and defining leadership roles for students and instructors such that high task engagement results. Computer functions cited as important include frequent and varied active student involvement or interaction and the use of visual and other sensory feedback to maintain student attention.

The point has been made by Lubin (1984) that for computer-based instruction to be effective, a new learning environment has to be created that mirrors the strong teaching/learning characteristics of live instruction. That is, a "human element" must be provided that can manage student attention and comprehension. A similar point has been made by Podenski (1984), who has argued that microcomputer-based technology should simulate ideal student-teacher interactions in a tutorial sense and thereby free teachers for more complex tasks, such as diagnosing general student learning problems, helping students develop appropriate learning strategies, and monitoring the effects of instruction. Barger (1983) has even more strongly argued that computers can show what it means to be human and help students become more human. He discusses how computers can be used to promote the human traits of autonomy, individuality, rationality, affectiveness, responsiveness, and creativity through creatively designed CAI programs that include interactive dialogues, feedback, and simulations.

Sprecher and Chambers (1980) discuss the fact that increases in the rate and amount of learning with CAI, as well as increases in student motivation, are largely due to the use of interactive capabilities of this medium in simulations, games, and tutorials. They point out that one factor which has affected the use of CAI, in addition to lack of quality instructional materials, is the perceived impact of computers on the socialization function of education and the concern among some educators that widespread or exclusive uses of computers in education may interfere with or prevent students' development as mature and responsible individuals in a larger social system. One suggestion given by Sprecher and Chambers to offset this dilemma is to use computers in a free-choice environment where students have the option of learning from the

computer or from the teacher. Another suggestion, advanced by David and Williams (1980) is to use CAI for group instruction in the form of demonstrations, cooperative team learning, group games, or a number of other strategies that could reduce the number of terminals used. Dugdale (1979) has similarly suggested that computers can be used to foster creative interactions among students through the use of games.

Intrinsically motivating features of games that can be incorporated into CAI enhancements have been the topic of some recent work by Malone and Lepper (in press; Lepper & Malone, in press). Particularly critical features include whether the game has a goal, whether the computer kept a score, and whether there were audio effects. In addition, the use of fantasy (e.g., graphics characters, story plots, sound effects) in evoking mental images helps students vicariously experience the satisfactions of power, success, fame, and mastery. It is suggested that CAI instruction capitalize on these features and help students identify with imaginary characters to increase the personalization of the medium and thereby promote identification and processing in self-referent terms. Evidence is presented that motivational embellishments that include multiple channels (e.g., visual graphics, text, and audio) can enhance learning because they (a) reinforce and make material to be learned more accessible and (b) permit students to seek out or employ the presentation mode most suited to their knowledge state or learning style.

Recent advancements in computer-based technologies now make it possible to include a rich array of audio and visual capabilities within interactive CAI lessons. Ginther (1983) discusses advances in the area of audio/speech devices that can be connected to a variety of common microcomputers. Benefits

cited for these devices include the elimination or reduction of reading requirements, the provision of multisensory exploration of new information, and the supplementation of visual materials. Interactive videodisc technology has also been cited as a potentially powerful device for enriching CAI presentations (e.g., Jonassen, 1984). The problems of lack of theoretical support and phenomenally high development costs are cited, however, as potential drawbacks for which lower-cost alternatives must be sought in order to provide the multisensory richness and personalization required to simulate instructor and group process functions.

An additional advantage of CAI as a medium for skills training is that it, in itself, can be motivating (Steinberg, 1979). To take full advantage of these inherently motivating qualities, it is necessary to employ effective instructional design principles that can help dictate appropriate use of this medium within particular content areas (Gagne, Wager, & Rojas, 1981; Steinberg, 1979). Steinberg (1979) points out that a mistake commonly made in the design of CAI lesson strategies is failure to take into account an essential difference between the classroom and CAI—the learning that can take place as a result of the responses of other students and the benefit of classroom interaction that must now be supplied by the CAI lesson. Implications for how CAI might be used to simulate group interactions can be drawn from the work of Bloom (1984), Bouton and Garth (1983), Cubberly, Omizo, & Longano (1984), Gagne (1983), Michaelson (1983), and Neale (1983). These include the use of multiple context case histories of meaningful peer problems in which students can interactively engage in identifying the problem, consequences, and alternative solutions through such techniques as computer-guided inquiry, imagery, and explanations.

A cognitive approach to computer courseware design and evaluation has recently been presented by Jay (1983). Within such an approach, considerations must be given to memory and attention demands, language and text characteristics, graphics and visual processing, and implications of the cognitive model for feedback. Specific suggestions given by Jay include integrating CAI with supplemental materials, encouraging depth of processing through elaboration techniques, communicating in a personal and friendly way, using multiple presentation formats, encouraging a dialogue with the learner, using highlighting and cuing to direct attention, using mnemonics and imagery techniques, using audio and enlarged text to emphasize important information, using inquiry techniques to encourage active responding, allowing for multiple answers, and using personalized feedback. These suggestions have relevance to the design of CAI enhancements for the present effort and for simulating instructor and group process functions.

In summary, this selective review of enhancements that can be provided by a CAI format and suggested design strategies has generally indicated features of this medium that can be used to simulate critical instructor and group process functions. In particular, careful selection of training content, careful design of CAI strategies, the incorporation of personalization through an integration of audio and visual capabilities, the identification of meaningful roles for instructors within this context, and use of the inherently motivating qualities of this medium should contribute to the effectiveness of the CAI enhancements.

Phase Ii Evaluation Study Method

Research Questions

The primary questions being addressed in this Phase II evaluation study were: (1) What is the relative effectiveness of CAI-enhanced versions of the Motivational Skills Training Program as compared with versions augmented by instructor and group process experiences? (2) Are there various combinations of CAI, instructor, and group experiences that contribute to the differential effectiveness of the motivational program? and (3) What are the implications of study findings for future implementations of the motivational program?

To answer the preceding questions, CAI introductory and practice segments were designed and developed for each of the seven motivational skills modules. An experimental evaluation was then conducted using instructors and students from the Electronic Communications (EC) school at Ft. Sill, Oklahoma. The following sections describe the design and evaluation procedures.

Design and Development of CAI/Audio Segments

The Phase I report for this project (McCombs et al., in press) laid out some general design guidelines for operationalizing the identified instructor and group functions in the CAI format. In addition, the decision was made in Phase I to develop a simple computer-controlled audio capability to achieve the personalization desired in the simulaton of instructor and group functions. The specific design strategies used to integrate the audio/CAI enhancements and simulate instructor and group functions are described below.

The character "PC," created to simulate instructor functions, was designed to enact three primary roles: facilitator, modeler, and motivator. In the

facilitator role, PC was designed to help students acquire new concepts, skills, and strategies via introductory explanations and practice exercises. In the modeler role, PC was designed to demonstrate the application of new concepts, skills, and strategies in guided practice segments. In the motivator role, PC was designed to coach and encourage students to apply new concepts, skills, and strategies in both introductory and practice segments. To assist students in knowing which role PC was playing at any point in time, screen messages were designed to appear in the upper left-hand portion during the time either the graphic figure of PC was presented, or text and audio messages from PC were being presented. When playing the facilitator role, the message, "Now you try it!" is displayed; when playing the modeler role, the message "Watch me!" is displayed; and when playing the motivator role, the message "Go for it!" is displayed.

To provide the identified group functions of peer identification, opportunities for shared problem solving, and peer modeling and feedback, a set of military characters was defined. As indicated in the introduction section of this report, these characters represented specific personal responsibility and self-control problems related to each module's content area. Case studies and audio scripts were prepared for each character and for the introductory and practice CAI segments. The characters were designed to "grow" as a result of their skill training from an initial inability to solve particular problems to competent problem solvers and self-managers. This transition occurred between PC's guided CAI introductions and CAI practice sessions for each module. (See McCombs et al., in press, for a definition of each character.) Not only are the characters' problems presented in the CAI segments, but processes used by the characters to work through these problems are exemplified.

Much of the modeling provided in the CAI segments is accomplished via the audio enhancements, while most of the actual skill practice is provided through the CAI exercises. These two functions are not entirely discrete, however, but are integrated into a single unified presentation via the audio interface. That is, the audio is integrated with screen presentations in the following ways: (a) the CAI screen reinforces audio information, (b) the audio information precedes a CAI segment or frame; (c) the audio information follows a CAI segment or frame; or (d) the audio is an integral part of a CAI segment or frame. Used in this way, the computer-controlled audio capability increases the level of personalization, simulates instructor and group process functions, enhances motivation through novelty, reduces reading demands, and adds to the cost effectiveness of the program as compared with other media.

Scripts were developed for the audio portions of the CAI segments, and professional and semiprofessional personnel were selected to play the parts of PC and the seven characters. Once the audio tapes had been recorded, pulses were added at points that coincided with CAI screen changes. The contractor-developed audio interface consists of a specially designed interface card which plugs into the Apple IIe game I/O port. The interface receives the pulses from a standard slide-sync audio cassete player. These pulses trigger screen changes and, in turn, allow the CAI software (in this case, the Apple SuperPILOT Authoring System) to control the on/off function of the audio player. This capability allows for computer control of a linear sequence of audio messages that coincide with particular CAI frame sequences, as well as provides for the personalization of skill training introductions and practices, at about one-eighth the cost of videodisc technology.

In general, the structure of the CAI introduction is to present case studies of a particular character's problem, provide a description of the tools students will acquire to solve each particular problem, and present a brief interactive practice of these skills. In the CAI practice segments, students receive a recap of the skills they learned in the printed module, exemplified by the module's character. Optional and nonoptional practice exercises are provided, followed by an integrative summary of skills and strategies learned. Special features of the CAI design also include the use of student contracts, special instructional games in the goal-setting area, problem solving scenarios, and some off-line practice exercises integrated with the CAI segment. Following the initial construction of the CAI/audio segments, personnel from the Ft. Sill Electronic Communications course visited the contractor and reviewed the materials. Suggestions regarding revisions were collected and the revisions were made as necessary.

Experimental Design

To address questions regarding the effectiveness of the CAI-enhanced versions of the motivational skills program, six experimental conditions were defined: an historical control group (HC), current control group (CC), a CAI introduction and practice group (CAI), a CAI introduction and instructor practice group (CAII), an instructor introduction and CAI practice group (ICAI), and an instructor introduction and practice group (II). Independent variables of interest (in addition to conditions) were student scores on the General, Electrical, and Clerical subscales of the Armed Services Vocational Aptitude Battery (ASVAB); military rank; Army component (Regular Army, National Guard, Reserve); sex; initial critical thinking skills; initial judgments of self-efficacy; and initial indices

of anxiety and ability to cope with stress. Dependent variables of interest were instructor ratings of students' self-management skills; time to complete the first and second EC course segments; test failure rates in the first and second EC course segments; progress index for the entire EC course; and whether students attrited or graduated.

Measures

The self-efficacy, anxiety and ability to cope with stress, and instructor questionnaire measures are the same as those described and included in the McCombs et al. (in press) report. The Critical Thinking Skills measure was one developed by McCombs (1980), with items patterned after Watson and Glaser's (1964) Critical Thinking Appraisal. The six items on this measure assess students' inferential and deductive reasoning skills, using examples relevant to the military. The response format is multiple-choice, with one correct answer per item. (A copy of the Critical Thinking Skills measure can be found in Appendix A of this report, along with the instructions students received prior to taking the initial pretest battery.)

Measures included in the pretest battery were "How I Feel About Myself" (self-efficacy measure), "Stress Profile" (anxiety and ability to cope with stress measure), and the "Critical Thinking Skills" (inferential and deductive reasoning skills measure). These measures were also administered following the first portion (approximately four weeks) of the EC course in order to assess any pre-post changes in these skills for experimental and control group students. The Instructor Questionnaires (ratings of students' self-management skills) were filled out by instructors at the end of the first course portion who had taught students during this portion of the course. It was expected that one possible impact of the

motivational skills training, in addition to increased course performance, might be increases in students' perceptions of competency, abilities to cope with stress, critical thinking or problem solving skills, and self-management skills.

Student ASVAB scores, times-to-complete, failure rates, progress indices, attritions, and graduates information were obtained from student records and computer printouts supplied by personnel in the EC school at Ft. Sill.

Subjects

Participants in the Phase II evaluation study were male and female students scheduled to begin the Electronic Communications school at Ft. Sill during the period of 25 October 1983 through 17 February 1984. Students who participated were in classes 3 through 16 of the course; performance data for these classes were collected through May 1984. Students were assigned to one of the five current experimental conditions by designated Ft. Sill personnel, using guidelines and procedures specified by the contractor. These guidelines specified that students in each entering class be randomly assigned to experimental and control conditions such that a balance of Army component (Regular Army, National Guard, Reserve) and male and female students was achieved across experimental and control conditions. A schedule of when each experimental condition occurred was prepared which specified that a single experimental condition be conducted during any given week, with any given class, beginning with the CAI condition and rotating through conditions until data on approximately 50 students per condition were collected. At the conclusion of the study, data on a total of 479 students were available for analysis. The number of students in each condition were as follows: 253 in the CC condition, 55 in the CAI conditon, 61 in the CAII condition, 53 in the ICAI condition, and 57 in the II condition.

An historical control group of 53 students was formed from EC course records for the purpose of having a comparison group removed in time that could be used to assess any possible effects of peer discussions among current experimental and control students about the content of the motivational training. This historical control group consisted of a representative sample of males and females, proportionately divided into Regular Army, National Guard, and Reserve components, from classes 2 through 15 who had been in the EC course in the previous year. Data from this historical control group was separately analyzed in terms of descriptive information on variables such as ASVAB scores, course completion times, failure rates, attritions, and graduates.

Procedures

A 4-day, 16-hour training program for three Ft. Sill EC course instructors designated as being responsible for the implementation of the Motivational Skill Training program and evaluation procedures was designed. The purpose of this training was to acquaint instructors with the purpose of the evaluation study, familiarize them with concepts and skills presented in the training program, provide guidelines for introducing each module and conducting the small group discussion/practice sessions at the end of each module, and describe specific procedures for implementing each experimental condition. Instructors were also trained in the content of the CAI materials and operation of the CAI equipment. A workshop format was used for this training, wherein three contractor personnel guided instructor participants through a training outline and provided models of the instructors' role in introducing the modules and leading the group sessions. Instructors were given opportunities to generate their own examples to be included in the introductions and their own practice exercises,

thereby arriving at personalized plans for conducting the skill training. To ensure a degree of comparability between the CAI and instructor conditions, instructors were provided with scripts of the case studies applying to each CAI character which they could use as part of their introductions and practice sessions for each module. (A copy of the instructor training outline and other handouts are included in Appendix B.) The instructor training was conducted from 18 through 21 October 1983, at which time five Apple IIe systems were also installed in the specially-designated classroom in the EC school.

The pretest measures were administered to control- and experimental-group students on the day they were regularly scheduled to begin the EC course. Following completion of the pretests, students were assigned to the control or experimental groups per contractor procedures (see Student Assignment Sheet in Appendix C). Control students began the EC course following this pretesting and their regular course orientation; experimental students were told to report to the specially designated classroom for the motivational training. Ft. Sill personnel responsible for assigning students to experimental and control conditions were briefed by contractor personnel to inform students that some of them would be randomly selected to participate in an experimental program. To minimize possible negative student reactions to being selected or not selected, no further details about the nature of the program were given. The number of students assigned to experimental conditions in any given class varied from 10 to 15, depending on the class size. The length of training for experimental students averaged 25 hours; training was conducted for 6 hours a day for 4 to 5 days, depending on the rate at which students completed the motivational training.

For students assigned to designated experimental conditions, they were instructed regarding the nature and purpose of the training and were told the

general procedures for completing this training. For students in the CAI conditions, they were told how to operate the computer equipment and were given a special Apple IIe orientation disk on system operation. Depending on the condition assigned, students were told that they would receive an introduction to the program and each module from either the instructor or computer, were then to read each module on their own, and return to the instructor or computer for practice sessions. Instructors responsible for the training monitored student progress through each module and for the instructor practice conditions, assembled students for group sessions when the last student had finished a particular module.

Following the completion of the motivational training, experimental students began their regular EC course work. The EC course is divided into two portions, the first of which is approximately 4 weeks long and the second of which is approximately 5 weeks long, for an average total length of approximately 9 weeks. The course is implemented in a self-paced mode wherein times to complete vary as a function of student ability and motivation. When the evaluation study began, course attrition rates were averaging approximately 28 percent. After the first week of the evaluation study, however, it was learned from Ft. Sill personnel that procedures had been implemented by the commander of the student battery responsible for students in the EC course wherein students whose progress rates met or exceeded 1.2 (where 1.0 is the average rate and more than 1.0 is a longer than average rate to complete the course) were being assigned to mandatory study sessions and denied leave privileges until their progress rates fell below 1.2. In subsequent discussions, Ft. Sill personnel indicated that this new battery procedure appeared to be reducing student attrition rates by approximately 10 percent. Thus, the possible influence of the motivational

skills training on student attrition was partially attenuated throughout the duration of the evaluation study period.

Postmeasures were administered by Ft. Sill personnel in the EC course at the end of the first course portion. Ft. Sill personnel were also responsible for collecting these measures for pickup by contractor personnel during monthly trips for the purpose of monitoring evaluation procedures. The monitoring trips were also conducted for the purpose of providing any follow-up training to instructors responsible for implementing the experimental conditions, as well as to answer special questions or solve unanticipated problems. Throughout the duration of the evaluation, monitoring visits indicated that procedures were being implemented with no serious problems and that instructors conducting the training were enthusiastic and very competently handling their training responsibilities.

Phase II Evaluation Study Results

Phase II Analysis Procedures

The major interest in the study was to examine whether the independent variable "experimental condition" was significantly related to various indices of student performance (i.e., the study dependent variables). The interest was not in omnibus comparisons involving the five experimental groups but, rather, in pairwise comparisons of groups on the variables of interest. Descriptive data from the historical control group (HC) was examined but not included in statistical comparisons.

Initial chi-square and t-test comparisons were made to determine whether students had been randomly assigned to groups according to instructions. In general, they had. Next, pairwise comparisons were made on the independent variables (i.e., possible covariates) which were not of central empirical interest, but which could possibly explain (influence) any group differences in performance. These possible covariates included measures of intellectual functioning (i.e., ASVAB scores) and pretraining measures of stress. Results showed that there were few, if any, meaningful differences among experimental conditions on the possibly confounding covariates. Thus, the group comparisons on the variables of interest were conducted with simple t-tests. For directional hypotheses (i.e., where one group was expected to score better than another) one-tailed probabilities were employed.

Final Subject Selection

Initial examination of the data revealed that the small number of students (n = 21) of military rank E-5 and above had been disproportionately

assigned to the current control (CC) group. These students were subsequently excluded from the study resulting in a final sample of 458 students. The number of students remaining in each condition were as follows: 233 in the CC condition, 55 in the CAI condition, 60 in the CAII condition, 53 in the ICAI condition, and 57 in the II condition. Table 1 presents the distribution of students by rank within condition. Pairwise chi-square comparisons of experimental conditions indicated that students were randomly distributed by rank across conditions.

Assignment of Students to Experimental Conditions

Recall that Ft. Sill personnel had been instructed to randomly assign students to conditions to achieve a balance of Army component and sex of student across experimental conditions. Table 2 shows that, with respect to Army component, this balance was not completely achieved. In particular, a disproportionately low percentage of National Guard and Military Reserve students were assigned to the CC condition. This result indicated that students' Army component might need to be controlled for in further analyses. However, a correlational analysis revealed that Army component was not significantly related to any other variable included in the study. Thus, the underrepresentation of National Guard and Military Reserve students in the CC condition was not problematic.

Table 3 shows that a very small percentage of the sample (4.1%) was female. Although females were not assigned randomly across all conditions, no provisions were made for controlling for sex of student in further analyses since such small numbers of females were present in the student population.

Table 1

Distribution of Students by Military Rank
Within Experimental Condition

Group	Military Rank* E-1	E-2	E-3	E-4	Row Total
CC	185 (79.4)	19 (8.2)	14 (6.0)	15 (6.4)	233
CAI	41 (74.5)	5 (9.1)	6 (10.9)	3 (5.5)	55
CAII	46 (76.7)	8 (13.3)	2 (3.3)	4 (6.7)	60
ICAI	44 (83.0)	7 (13.2)	2 (3.8)	0 (0.0)	53
II	46 (80.7)	3 (5.3)	5 (8.8)	3 (5.3)	57
	362 (79.0)	42 (9.2)	29 (6.3)	25 (5.5)	458

Comparison	$X^2(3)$	p
CC vs. CAI	1.79	.618
CC vs. CAII	2.06	.559
CC vs. ICAI	5.08	.166
CC vs. II	1.15	.765
CAI vs. CAII	2.91	.406
CAI vs. ICAI	5.40	.145
CAI vs. II	.84	.839
CAII vs. ICAI	3.69	.297
CAII vs. II	3.63	.305
ICAI vs. II	5.79	.122

*Row percentages in parentheses.

Table 2

Distribution of Students by Army Component
Within Experimental Condition

	Army Component*		
Group	Regular Army	National Guard or Reserve	Row Total
CC	198 (85.0)	35 (15.0)	233
CAI	40 (72.7)	15 (27.3)	55
CAII	46 (76.7)	14 (23.3)	60
ICAI	31 (58.5)	22 (41.5)	53
II	41 (71.9)	16 (28.1)	57
	356 (77.7)	102 (22.3)	458

Comparison	$X^2(1)$**	p
CC vs. CAI	3.84	.050
CC vs. CAII	1.81	.179
CC vs. ICAI	17.36	.000
CC vs. II	4.52	.033
CAI vs. CAII	.07	.786
CAI vs. ICAI	1.84	.175
CAI vs. II	.00	1.000
CAII vs. ICAI	3.49	.062
CAII vs. II	.14	.708
ICAI vs. II	.19	.665

*Row percentages in parentheses.

**Yate's correction applied.

Table 3

Distribution of Students by Sex
Within Experimental Condition

	Sex*		
Group	Female	Male	Row Total
CC	3 (1.3)	230 (98.7)	233
CAI	3 (5.5)	52 (94.5)	55
CAII	2 (3.3)	58 (96.7)	60
ICAI	4 (7.5)	49 (92.5)	53
II	7 (12.3)	50 (87.7)	57
	19 (4.1)	439 (95.9)	458

Comparison	$X^2(1)$**	p
CC vs. CAI	2.02	.155
CC vs. CAII	.28	.595
CC vs. ICAI	4.71	.030
CC vs. II	13.48	.0002
CAI vs. CAII	.01	.921
CAI vs. ICAI	.003	.960
CAI vs. II	.87	.350
CAII vs. ICAI	.33	.564
CAII vs. II	2.16	.142
ICAI vs. II	.26	.611

*Row percentages in parentheses.

**Yate's correction applied.

Attrition Rates

The first dependent variable of interest was graduation status: i.e., whether students graduated or attrited from the course of study. The pairwise chi-square group comparisons presented in Table 4 indicate that there were no statistically significant differences in student attrition rates across groups. The overall attrition rate was 22.7 percent. From a practical standpoint, however, it is of interest that the lowest percentage of attritions were in the CAI (14.5%) and II (19.3%) conditions.

Examination of Potential Covariates

Following the analysis of attrition rates, students who did not graduate were excluded from further analyses since scores for these students were not available on the remaining dependent variables (e.g., progress index). Thus, in the results which follow, the total sample is comprised of 354 students. The number of students remaining in each condition was as follows: CC ($\underline{n}$ = 175), CAI ($\underline{n}$ = 47), CAII ($\underline{n}$ = 46), ICAI ($\underline{n}$ = 40), and II ($\underline{n}$ = 46).

The pairwise group chi-square comparisons presented in Table 5 show that these remaining students were randomly distributed across study conditions by military rank, but not by Army component. As in the previous analysis, the lack of random assignment to conditions by Army component was not considered problematic since correlational analyses revealed that Army component was not significantly related to any other study variables for the sample of interest.

Recall that the independent variable of primary interest is experimental condition. All other independent variables are potential covariates. Table 6 shows that there were no pre-existing significant differences across groups on ASVAB scores. Thus, each of the five groups was composed of students of similar

Table 4

Distribution of Students by Graduation Status
Within Experimental Condition

	Graduation Status*		
Group	Graduated	Attrited	Row Total
CC	175 (75.1)	58 (24.9)	233
CAI	47 (85.5)	8 (14.5)	55
CAII	46 (76.7)	14 (23.7)	60
ICAI	40 (75.5)	13 (24.5)	53
II	46 (80.7)	11 (19.3)	57
	354 (77.3)	104 (22.7)	458

Comparison	$X^2(1)$**	p
CC vs. CAI	2.14	.143
CC vs. CAII	.01	.935
CC vs. ICAI	.00	1.000
CC vs. II	.51	.474
CAI vs. CAII	.92	.337
CAI vs. ICAI	1.14	.286
CAI vs. II	.17	.676
CAII vs. ICAI	.00	1.000
CAII vs. II	.09	.759
ICAI vs. II	.19	.665

*Row percentages in parentheses.

**Yate's correction applied.

Table 5

Chi-Square Group Comparisons for Students Who Graduated: Military Rank and Army Component

Comparison	Military Rank		Army Component	
	$X^2(3)$	p	$X^2(1)$*	p
CC vs. CAI	2.99	.393	4.63	.032
CC vs. CAII	1.15	.766	1.54	.214
CC vs. ICAI	4.25	.236	19.04	.000
CC vs. II	4.52	.211	8.15	.004
CAI vs. CAII	1.38	.710	.16	.686
CAI vs. ICAI	3.90	.273	2.18	.140
CAI vs. II	3.08	.380	.09	.769
CAII vs. ICAI	2.73	.435	4.25	.039
CAII vs. II	5.18	.159	.84	.360
ICAI vs. II	6.99	.072	.96	.328

*Yate's correction applied.

Table 6

T-Test Results for Group Comparisons on ASVAB Variables

Comparison	ASVAB Variables: General T Value	General DF	General 2-Tail Prob.	Electrical T Value	Electrical DF	Electrical 2-Tail Prob.	Clerical T Value	Clerical DF	Clerical 2-Tail Prob.
CC vs. CAI	.43	178	.67	.76	178	.45	.14	124	.89
CC vs. CAII	.56	163	.57	.55	163	.59	.37	116	.72
CC vs. ICAI	1.16	176	.25	1.54	176	.13	.49	112	.63
CC vs. II	.87	173	.39	1.38	173	.17	.15	114	.88
CAI vs. CAII	.83	55	.41	.88	55	.38	.39	32	.70
CAI vs. ICAI	1.28	68	.20	1.56	68	.12	.57	28	.58
CAI vs. II	1.23	65	.22	1.63	65	.11	.05	30	.96
CAII vs. ICAI	.30	53	.77	.51	53	.61	.10	20	.92
CAII vs. II	.13	50	.90	.47	50	.64	.32	22	.75
ICAI vs. II	.24	63	.81	.14	63	.89	.47	18	.64

abilities. (A table of group means and standard deviations for all study variables is included in Appendix D.)

Examination of other potential covariates (i.e., critical thinking skills, self-efficacy, adaptation, frustration, overload, deprivation, nutrition, self-perception, type A behavior, and anxiety pretests) revealed few significant pre-existing differences among student groups. Of the 100 t-tests conducted (i.e., 10 pairwise comparisons of groups on 10 variables) only seven t-tests proved to be significant. There was no identifiable pattern to these differences and, indeed, the number of significant t-tests (7) was not much different than that expected by chance (5) employing the .05 probability level as a significance criterion. Correlational analyses revealed that, of these 10 variables, only the self-perception subscale of the stress pretest was significantly related to any independent variable (i.e., the progress index). No two groups differed on the self-perception pretest. Thus, there was little reason to "control" for the effects of these potential covariates in subsequent analyses.

Analyses of Major Dependent Variables

There were seven dependent variables of major interest: instructor ratings of students, number of student test failures on the first portion of the course (tasks 1-16), number of student test failures on the second portion of the course (tasks 17-26), total number of student test failures, time to complete tasks 1-16, time to complete tasks 17-26, and student progress index (essentially an indicator of total time for tasks 1-26). Table 7 presents the results of pairwise comparisons of the five study conditions on these variables.

There were no significant differences in instructor ratings of students or in number of failures on tasks 1-16 across conditions. For number of failures on

Table 7

Group Comparisons on Major Dependent Variables*

Comparison	Instructor Questionnaire			Failures: Tasks 1-16			Failures: Tasks 17-26			Failures: Total			Time on Tasks 1-16			Time on Tasks 17-26			Progress Index		
	T	DF	p	T	DF	p	T	DF	p	T	DF	p	T	DF	p	T	DF	p	T	DF	p
CC vs. CAI	.75	189	.453	1.04	219	.301	.63	220	.527	.88	219	.379	.45	220	.654	1.40	220	.164	1.01	220	.314
CC vs. CAII	1.54	178	.124	1.41	219	.161	1.41	219	.160	1.85	219	.065	1.25	219	.211	.39	219	.698	.56	219	.573
CC vs. ICAI	.14	182	.888	.22	213	.827	1.46	213	.146	.94	213	.347	.31	213	.754	.15	213	.880	.07	212	.946
CC vs. II	.84	184	.403	1.20	219	.231	1.04	219	.299	1.49	219	.137	2.21	219	.028	1.98	219	.049	2.22	219	.027
CAI vs. CAII	.70	71	.486	1.92	90	.058	1.52	91	.132	1.99	90	.050	66	91	.510	1.45	91	.150	1.29	91	.201
CAI vs. ICAI	.48	75	.636	.95	84	.346	.59	85	.556	.09	84	.925	.07	85	.948	.93	85	.356	.72	84	.475
CAI vs. II	.09	77	.929	1.78	90	.079	1.26	91	.211	1.79	90	.077	1.46	91	.147	2.75	91	.007	2.58	91	.011
CAII vs. ICAI	1.13	64	.261	.87	84	.386	2.02	84	.046	1.87	84	.064	.62	84	.540	.42	84	.679	.49	83	.628
CAII vs II	.62	66	.536	.17	90	.867	.35	90	.731	.32	90	.752	.70	90	.488	1.30	90	.198	1.31	90	.192
ICAI vs. II	.57	70	.568	.72	84	.471	1.80	84	.075	1.69	84	.094	1.28	84	.204	1.62	84	.109	1.70	83	.092

*Two-tailed probabilities are reported. For results involving the CC condition the one-tailed probability may be derived by dividing the two-tailed probability by two. For example, the one-tailed probability for CC vs. CAII on "Failures: Total" is .032. It is appropriate to employ the one-tailed probability in this instance since the experimental hypothesis is that the CAII group will have fewer failures than the CC group.

tasks 1-16, the results of two analyses approached significance. Specifically, students in the CAI condition tended to fail more frequently than students in the CAII ($p = .058$) and II ($p = .079$) conditions. For failures on tasks 17-26, students in the ICAI condition failed significantly more often than students in the CAII condition ($p = .046$) and tended to fail more often than students in the II condition ($p = .075$). In terms of total number of test failures, a number of findings were either significant or approached significance. Specifically, students in the CAII and II conditions tended to fail less often than students in other conditions: CAII vs. CC ($p = .032$), CAII vs. CAI ($p = .050$), CAII vs. ICAI ($p = .064$), II vs. CC ($p = .068$), II vs. CAI ($p = .077$), and II vs. ICAI ($p = .094$). Thus, the pattern that emerges is that students who received "instructor practice" as part of the Motivational Skills Training Program tended to have fewer total test failures than other groups of students. This finding cannot be accounted for by pre-existing group differences.

The results for "time on tasks" and progress index show that the II group completed tasks significantly faster than the CC group: time on tasks 1-16 ($p = .014$), time on tasks 17-26 ($p = .025$), and progress index ($p = .014$). The students in the II condition also tended to complete tasks significantly faster than students in the CAI condition: time on tasks 17-26 ($p = .007$) and progress index ($p = .011$). Further, students in the II condition tended to complete tasks faster than students in the ICAI condition: time on tasks 17-26 ($p = .109$) and progress index ($p = .092$). Thus, in general, students who received Motivational Skills Training in the II condition tended to complete training faster than students in the control condition and faster than students who received Motivational Skills Training in conditions which did not include instructor practice.

Pre-Posttest Comparisons of Critical Thinking, Self-efficacy, and Stress Indicators

A Critical Thinking test, a self-efficacy scale and eight stress indicator scales were administered before the Motivational Skills Training Program and after students had completed the first 16 training tasks. Table 8 shows the results of within-group comparisons of pretest and posttest indicators. Variable means and standard deviations are included in Appendix D to aid in interpretation of results.

On the Critical Thinking test, pre-posttest comparisons were significant for the CC, CAII, and ICAI groups. The fact that the CC group, who did not receive Motivational Skills Training, improved significantly on the Critical Thinking posttest indicates that improved scores on the posttest may have been due to test familiarity rather than Motivational Skills Training since the same test form was employed in both the pre- and posttest. One anomalous finding was that the CAI group actually scored lower on the posttest than on the pretest (although not significantly lower).

Table 8 also shows that there were no significant changes in self-efficacy in any group on the pre- posttest comparisons.

In general, across all conditions but II, there was a substantial number of stress indicators on which pre-posttest differences were either significant or approached significance. These significant differences were in the expected direction (e.g., the CAI group had better self-perceptions on the posttest than on the pretest). These changes, however, cannot be attributed to Motivational Skills Training for two reasons. First, Table 8 shows that there were many significant pre-posttest differences on stress indicators for the CC group which did not receive Motivational Skills Training. Second, further pairwise t-tests of

Table 8

One-tailed T-test Probabilities:
Pre-Posttest Comparisons of Critical Thinking, Self-efficacy, andStress Indicators

Condition	df	Critical Thinking	Self-Efficacy	Stress Scale: Frustration	Overload	Deprivation	Self-Nutrition	Type A Perception	Behavior	Anxiety
CC	170	.002	.263*	.021	.006	.047	.181	.012	.020	.000
CAI	35	.159*	.100	.450	.066	.359	.006	.032	.016	.075
CAII	45	.050	.396*	-.395*	.045	.032	.329	.022	.301	.303
ICAI	40	.002	.269	.362.	.361	.070	.216	.047	.067	.067
II	46	.115	.345	-.004*	.330	.123	.101	.415	-.282*	.476

*Change is in direction opposite of expected direction of change.

pre-posttest differences between experimental groups indicated that the CC group was not significantly different from the other groups in terms of amount of positive change on the stress indicators.

One perplexing finding was that the II group, which scored best in terms of technical training performance indicators, exhibited less positive change (and in some cases, negative change) over time, as compared to other treatment groups, on the stress indicators which Motivational Skills Training is thought to influence.

Exploratory Individual Difference Comparisons for the CAI vs. II Conditions

Individual difference comparisons between the CAI and II conditions were of particular interest since these groups represent the extremes of the computer-versus instructor intensive modes of delivering the Motivational Skills Training Program. A number of exploratory analyses of variance (ANOVAS) were run on these two groups. These analyses were all 2 by 3 ANOVAs (i.e., Groups = CAI, II: "other independent variables" = low, medium, high). The "other independent variables" of interest were ASVAB general, ASVAB electrical, critical thinking pretest, self-efficacy pretest, and self-perception pretest. ANOVAs employing these independent variables were run on each of six independent variables (i.e., progress index, failures on tasks 1-16, time to complete tasks 1-16, failures on tasks 17-26, time to complete tasks 17-26, and total test failures) for a total of 30 ANOVAs.

Of the 30 ANOVAs run, nine analyses indicated "significant" interaction effects. Due to the highly exploratory nature of these analyses, the .10 probability level was termed significant. Significant interactions are summarized in Table 9. These results should be interpreted with caution for two reasons: the

Table 9

Summary of Condition (2) by Independent Variable (3)
Significant Analysis of Variance Interactions: CAI vs. II Conditions

Independent Variable	Dependent Variable	Condition	Independent Variable Score* Low		Medium		High		p	(df)
ASVAB General	Progress Index	CAI	.97	(13)	.97	(15)	.89	(8)	.025	(2,61)
		II	.91	(4)	.83	(17)	.93	(10)		
ASVAB General	Failures on Tasks 1-16	CAI	2.00	(13)	1.80	(15)	.63	(8)	.102	(2,61)
		II	2.25	(4)	.71	(17)	.80	(10)		
ASVAB General	Time to Complete Tasks 1-16 (in hours)	CAI	112	(13)	119	(15)	100	(8)	.004	(2,61)
		II	126	(4)	96	(17)	104	(10)		
ASVAB General	Time to Complete Tasks 17-26 (in hours)	CAI	241	(13)	224	(15)	208	(8)	.038	(2,61)
		II	197	(4)	196	(17)	225	(10)		
ASVAB Electrical	Time to Complete Tasks 17-26 (in hours)	CAI	239	(13)	227	(16)	203	(7)	.088	(2,61)
		II	190	(6)	224	(11)	197	(14)		
Critical Thinking Pretest	Progress Index	CAI	.94	(13)	.86	(6)	.94	(16)	.069	(2,72)
		II	.89	(12)	.90	(16)	.81	(15)		
Critical Thinking Pretest	Time to Complete Tasks 1-16 (in hours)	CAI	111	(13)	98	(6)	110	(16)	.012	(2,72)
		II	110	(12)	111	(16)	87	(15)		
Self-Efficacy Pretest	Failures on Tasks 1-16	CAI	.92	(12)	1.50	(14)	1.33	(9)	.064	(2,75)
		II	1.64	(11)	1.06	(16)	.53	(19)		
Self-Perception Pretest	Failures on Tasks 1-16	CAI	.85	(13)	1.64	(11)	1.36	(11)	.038	(2,75)
		II	1.70	(10)	1.00	(10)	.69	(26)		

*Students were designated as low, medium, or high on each variable based on their relative position in the total study sample. Approximately one-third of the total sample was assigned to each level of each independent variable. Cell ns are in parentheses.

liberal "significance" criterion employed and small cell ns in many cases. With these limitations in mind, the following results are presented as suggestive.

- In general, students in the CAI group who had high ASVAB general scores outperformed CAI group students with low and medium ASVAB general scores, while II group students who had medium ASVAB general scores performed better than II students with low or high ASVAB general scores.

- In the CAI group, students who scored in the medium range on the critical thinking pretest performed better in later coursework, while II group students who scored high on the critical thinking pretest scored higher than other II group students on training course performance indices.

- Students in the CAI group who scored low on pretest indices of self-efficacy and self-perception had fewer failures on technical tasks 1-16 than did other students in the CAI group, while students in the II group followed the expected pattern: the higher one's self-efficacy and self-perception, the lower the number of test failures.

Figures 1 and 2 present generalized graphic representations of the findings. As indicated, these findings are suggestive and there is a need for a more large-scale replication before definitive conclusions can be drawn. Taken at face value, however, these findings indicate that there may be individual differences on certain ability and self-report measures which are predictive of differential rates of course performance and related to different modes of delivery of the Motivational Skills Training Program. The results with ASVAB general and Self-Efficacy/Self-Perception are particularly interesting in that the correlation between ASVAB general and these two measures is very low (r's = .08 and -.10, respectively). This implies that approximately half of the students may benefit from the CAI treatment (i.e., high ASVAB general and low Self-Efficacy/Self-Perception students).

Historical Control Group (HC)

The descriptive data for the HC group is summarized in Table 10. The HC group was similar to the students from the other five experimental conditions

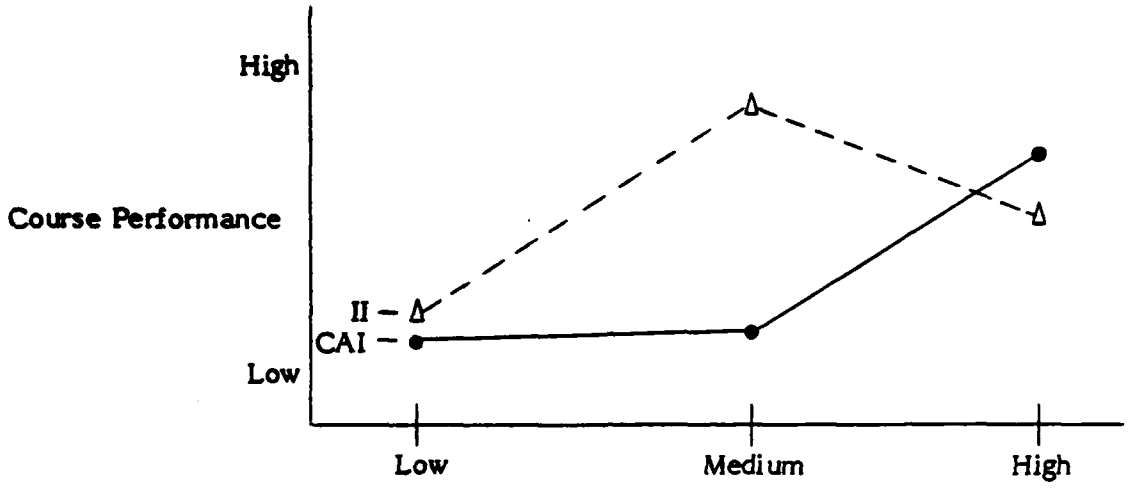

Figure 1. Schematic representation of the relationship between course performance and ASVAB general scores.

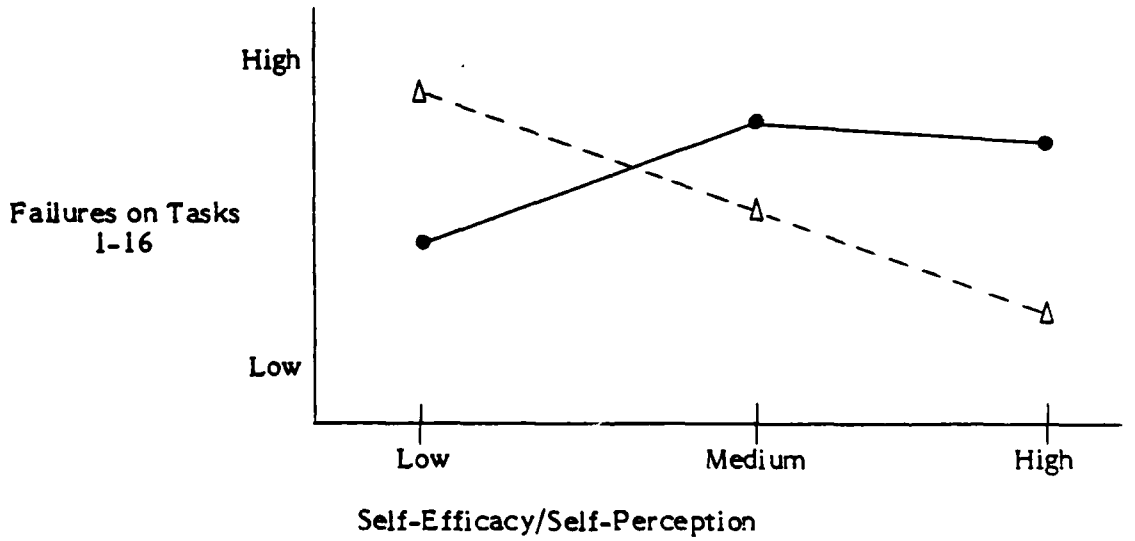

Figure 2. Schematic representations of the relationship between failures on Tasks 1-16 and self-efficacy/self-perception pretests.

Table 10

Descriptive Statistics: Historical Control Group*

Total Group (n= 51)

	E-1	E-2	E-3
Military Rank	33 (64.7)	11 (21.6)	7 (13.7)

	Regular Army	National Guard or Reserve
Army Component	40 (78.4)	11 (21.6)

	Female	Male
Sex	6 (11.8)	45 (88.2)

	Graduated	Attrited
Graduation Status	35 (68.6)	16 (31.4)

Graduates Only (n = 51-16 = 35)

	E-1	E-2	E-3
Military Rank	23 (65.7)	7 (20.0)	5 (14.3)

	Regular Army	National Guard or Reserve
Army Component	27 (77.1)	8 (22.9)

	Mean	Standard Deviation
General ASVAB	109.5	10.07
Electrical ASVAB	111.3	9.13
Clerical ASVAB	104.3	14.15
Total Test Time	340.6	53.7
Progress Index	1.02	.148
Total Test Failures	2.14	1.73

*Row percentages in parentheses

combined (see Tables 1-4 and Appendix D). For example, when military rank is compared, 86.3 percent of the HC students and 88.2 percent of the students in the other five conditions were of rank E-1 or E-2. For army component, 78.4 percent of the students in the HC group were Regular Army vs. 77.7 percent in the other five conditions. In the HC condition, 88.2 percent of the students were male vs. 95.9 percent males in other conditons.

The mean scores of students in the HC group on ASVAB test were 109.5, 111.3, 104.3 on the general, electrical, and clerical batteries, respectively. Comparable means for students in the other five conditions were 106.5, 108.6, and 102.4. Thus, students in the HC group tended to score slightly higher on ASVAB tests than students in other conditions.

Attrition rates were slightly higher for HC students than other students (31.4% vs. 22.7%).

Also, students in the HC group tended to take longer than students in the other five conditons to complete coursework. The progress index means for the HC vs. other students were 1.02 and .91, respectively. At the same time, students in the HC conditon tended to have fewer mean test failures (2.14) than other students (2.81). A possible explanation for progress rate and test failure differences between the HC and CC groups may be the battery-instituted procedures for monitoring students' course progress during the current study. (See pp. 20-21.)

Anecdotal Data

Anecdotal data available in this evaluation included instructor comments, student comments, and contractor observations.

Comments obtained from Ft. Sill instructors responsible for conducting the motivational skills training indicated that:

1. students were enthusiastic about participating in the skills training program;

2. students participating in the skills training tended to continue using their new skills after the training was over;

3. students participating in the skills training tended to get more out of the instructor conditions, but the CAI conditions were easier to implement;

4. instructors were dedicated and committed to the value of the motivational skills training; and

5. instructors felt most students should get this training to help them decide what they want in the Army and their lives.

Student comments generally indicated that (a) students felt positive about the training program content and expressed the opinion that the training was of such value that it should be made available to all students; (b) students were positive toward the CAI conditions but tended to feel they got more out of the instructor conditions; (c) students felt the skill training would benefit them both in their subsequent technical training course and in their personal lives; and (d) students found no portions of the motivational training, including the CAI segments, that they felt should be changed.

Contractor observations of students participating in the motivational skills training generally agreed with comments made by the instructors. That is, students were generally observed to be enthusiastic about the training and to have no difficulties adapting to different treatment conditions. In addition, instructors were observed to be highly motivated and competent in their implementation of the training and treatment conditions.

Discussion and Conclusions

Summary of Evaluation Findings

The Phase II experimental study was designed to evaluate the relative effectiveness of CAI enhanced versions of the Motivational Skills Training Program as compared with instructor/group versions, and to make recommendations for future implementations of the program within Army technical training. The study results indicate that students who received the motivational skills training with instructor introductions/group practice sessions (II condition) performed better during subsequent technical training than either students who received no motivational skills training (CC condition) or students who received the motivational skills training via CAI with no instructor practice (CAI and ICAI conditions). This better performance was manifested in terms of both significantly fewer test failures during training and less time for completion of training. These findings cannot be attributed to pre-existing differences among groups since group assignment appeared to be random and the groups exhibited no important differences on possibly confounding covariates (i.e., ASVAB scores and stress indicator pretests).

Additional findings of interest are that, as compared to the control condition, students receiving either the CAI or II conditions tended to have lower attrition rates. Although these differences were not statistically significant, the 8.2 percent reduction for the CAI condition and 4.4 percent reduction for the II condition may have some practical significance in terms of training costs. These attrition findings are particularly noteworthy in light of the fact that during the conduct of the study, new procedures were being implemented in the student battery (housing area) to improve the performance of students not progressing through the course at a satisfactory rate (see pages 20 and 21 of this report). This battery procedure had some obvious effects on student performance in general, as

evidenced by comparisons with the historical control group. That is, for similar students going through the Electronics Communication course a year earlier, attrition rates were 5.2 percent higher than for students in the current study, and progress indices were approximately 12 percent higher. Thus, it is likely that findings with the Motivational Skills Training Program were attenuated because of the new procedures being implemented in the student housing area.

Since one of the original purposes of the evaluation study was to determine if the CAI treatments could reduce requirements for instructor support for this type of motivational training, the findings of no overall superiority of CAI vs. instructor augmented (II) conditions were somewhat disappointing. For this reason, some exploratory analyses of potential individual differences in subsequent student performance as a function of treatment condition were conducted. These analyses generally indicated that the CAI condition is at least equally effective for approximately half of the students (i.e., those students of high general ASVAB ability and those students with low perceptions of competence or self-esteem). That is, there is some preliminary evidence that for students of high general ability and for students who have feelings of incompetence, the CAI treatment provides an effective and perhaps less threatening environment for learning self-management and personal responsibility skills than the instructor/group (II) treatment. These findings imply that there may be systematic and reliable individual differences that could be used in differential treatment format assignments, thereby reducing some of the instructor support requirements for the motivational program as well as capitalizing on the use of microcomputer technology for this type of training.

Instructor and student comments and contractor observations generally supported the positive results found for the Motivational Skills Training Program. Students and instructors were positive and enthusiastic about the program and felt

the program was beneficial for application both in subsequent technical training and in students' personal lives. In addition, although students generally preferred the instructor augmented vs. CAI conditions, they were positive about the CAI versions and instructors also indicated that the CAI versions were easier to implement. In total, then, the Motivational Skills Training Program appears to have achieved the goal of providing needed and relevant training and to have contributed to improvements in students' subsequent technical training performance. Furthermore, Phase II evaluation findings generally support Phase I evaluation findings, i.e., they substantiate the importance of instructor and group experiences as enhancements to this type of skill training, at least for some types of students. Additional implications of study findings are discussed in the next section, followed by recommendations for future implementations of the motivational program in Army technical training contexts.

Implications of Study Results

A major assumption of the current study was that well designed CAI introductory and practice segments, implemented via a rich microcomputer/audio technology mix, could provide the degree of personalization and simulation of critical instructor and group functions to offset or partially reduce instructor and group process requirements for this type of motivational skills training. Main effect findings with various combinations of CAI and instructor/group supported conditions did not bear out this assumption. This raises the possibility that, in line with Clark's (1983, 1984) arguments concerning the influence of media on learning, that the CAI/audio combination was not sufficiently matched to the content and method of instruction required in this training context. The main effect findings also reinforce Jernstedt's (1983) point that CAI technologies cannot be used as replacements for teachers and group learning, and that there is a need for a synergetic combination of the human and computer functions to achieve maximum instructional effectiveness.

The exploratory individual difference analyses have suggested, however, that the CAI enhanced version of the motivational training was at least equally effective for some types of students. Of the individual difference variables available for inclusion in these exploratory analyses, the findings with the general ability measure (ASVAB General) are not surprising. That is, a number of studies have found CAI or other multimedia treatments to be equally effective as traditional instructor/group methods for high ability students (e.g., Clark, 1984; Kulik, Bangert, & Williams, 1983; McCombs & McDaniel, 1983). On the other hand, the findings that students low in perceptions of competence or self-esteem subsequently perform better if they received the CAI enhanced version vs. the instructor/group version of the motivational training are, on the surface, somewhat puzzling. A plausible explanation, however, may be derived from a consideration of the characteristics of individuals who are low in perceptions of competence or self-efficacy.

Albert Bandura's (1982a, 1982b) theory of self-efficacy suggests that individuals low in perceived competence are those who do not judge themselves as capable of handling particular situations, including interpersonal situations. Because of their low feelings of personal adequacy, low self-efficacy/self-esteem individuals are often times threatened in interpersonal or social situations and fearful of having their perceived inadequacies exposed. For these types of individuals, then, it is reasonable that the more individual and nonpersonal medium of CAI may provide a less threatening learning environment, particularly for this type of self-development training that requires considerable self-analysis and self-exposure. As Bowman (1982) has pointed out, some advantages of computer-based technologies include (a) freedom from fear of reprisal, ridicule, or rejection; and (b) provision for active involvement in tasks that are based on a high probability of success. Thus, it may be that the medium of CAI, used for

motivational skill training that aims in part at enhancing individuals' perceptions of competency and personal control, is a more optimal treatment mode for those students whose initial perceptions of self-efficacy are low.

The preceding speculations do, of course, need to be verified by further research. As pointed out by Simutis (1979) and Sprecher and Chambers (1980), the real potential of CAI lies in its ability to provide individualized, standardized, and efficient instruction to learners, particularly adult learners who require remedial training. These individualization issues thus need to be adequately explored, along with the general individualization issue of what types of students are most in need of this type of motivational training, such that differential assignment to the motivational program can be made prior to differential assignment of individuals who need the training to particular training formats. There is little question based on the research reported here that instructors and the group process play a critical role in the success of motivational training and the success of individualized computer-based approaches in general (McCombs, in press). This and additional research issues to be explored with the Motivational Skills Training Program, therefore, form a basis for the following recommendations for future implementations of this program in Army technical training.

Recommendations for Future Implementations of the Motivational Program

To capitalize fully on the potential benefits of the Motivational Skills Training Program for enhancing subsequent student performance in technical training, research needs to be addressed at systematically exploring the issues listed below.

(1) One expectation in the current study was that the Motivational Skills Training Program might contribute to increases in students' perceptions of competence, abilities to cope with stress, critical thinking skills, and instructor ratings of self-management skills. The results indicated no significant pre/post

differences in the first three variables in this set, and no significant posttraining differences in instructor ratings for experimental vs. control conditions. These findings raise the question of what was learned (knowledges and skills) as a result of the motivational training, as well as differences in this learning as a function of the CAI vs. instructor/group training formats. It also raises the need to establish the relationship between what is learned in the motivational program and subsequent performance in technical training. It is recommended, therefore, that future implementations of the motivational program include an analysis of what is learned, a development of well defined measures of the identified knowledges and skills, and an exploration of relationships between these measures of what is learned in the motivational training and subsequent student performance.

(2) The exploratory individual difference analyses were suggestive of the potential benefits of the CAI enhanced version of the Motivational Skills Training Program for certain types of students. As indicated in the preceding section, there is the need to systematically explore (a) what types of students would most benefit from the motivational program and (b) of those students who would benefit from the program, what individual difference characteristics are predictive of the CAI vs. instructor/group version of this program. It is recommended, therefore, that in conjunction with investigations of what is learned in the motivational program, research be conducted in future implementations of the program that also includes investigations of individual differences predictive of what types of students need the motivational program and particular program formats.

(3) The questions in the areas of what is learned, individualization, and optimal treatment format for the Motivational Skills Training program need to be addressed in the larger context of additional improvements that can be made to

the program that will enhance skill maintenance and transfer to other training contexts (e.g., subsequent field unit training). The program has currently been implemented as an intensive skills training course which students receive prior to entering their technical training course. The primary skill maintenance strategy, in addition to those that encourage students to continue to monitor their self-management/self-motivation skills following initial training, has been to rely on course instructors trained to administer the motivational program as the vehicle for reminding and encouraging students to continue using newly developed motivational skills. No attempts have yet been made to systematically evaluate the effectiveness of more potent and perhaps more practical skill maintenance strategies such as embedding reminders to students to employ various motivational strategies at critical points in their subsequent technical training (e.g., when they encounter problems with stress or need to use problem solving or goal setting skills). A final recommendation is thus to analyze, identify, and evaluate a set of skill maintenance strategies that can operate within the total context of an individualized Motivational Skills Training Program.

The current evaluation of CAI enhancements to the Motivational Skills Training Program has contributed to our understanding of the potential benefits of this program and of augmentations possible with microcomputer/audio technologies. Once the questions raised in this section are answered, however, the full benefits of the motivational program can be assessed. In addition, the benefits of microcomputer/audio technologies for offsetting or reducing instructor support requirements for this type of skills training can then be more completely understood.

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Appendix A:

Critical Thinking Skills Measure
and Pretest Instructions

NAME _____ DATE _____

CRITICAL THINKING SKILLS

Directions:

The ability to think involves many critical skills. Your task on this test is to read each item carefully and then pick the answer (the conclusion or statement) which you think follows from the information given in the item. Thus, you are to read and judge each conclusion or statement for each item, and pick the one which necessarily follows from what is said in the item, or which follows beyond a reasonable doubt. Don't be concerned if some of the items contain silly, funny, or untrue information. Your job is to reason logicaly from the information you have in the item.

1. Some Russians want to control the world. All Russians want a better life. Therefore, _____.

   a. Some Russians who want a better life also want to control the world.
   b. All Russians who want a better life want to control the world.
   c. All Russians do not like their present standard of living.
   d. Some Russians who want a better life do not like their standard of living.

2. On one technical training base there are 52 courses in five technical schools. Each course contains from 10 to 40 students. Therefore, _____.

   a. No technical school contains fewer than 10 courses.
   b. Most courses contain more than 15 students.
   c. There are more than 500 students in these technical schools.

3. At the end of the first block of training, students who were on the first shift averaged 10 points higher than students on the second shift on the end-of-block test. The instructors on the first and second shifts used different methods of teaching. Therefore, _____.

   a. The instructors on the first shift had better discipline than the instructors on the second shift.
   b. The students on the first shift were smarter and learned more easily than the students on the second shift.
   c. The higher block scores achieved by students on the first shift were due to the better teaching method of that shift's instructor.
   d. The performance of students and the kind of teaching method on the first shift were better than on the second shift.

4. On a certain base where school attendance rules were rigidly enforced, it was found that only 80 percent of the students had a perfect attendance record. Among those on the second shift, however, 95 percent had a perfect attendance record. Therefore, _____.

   a. If students who tended to be absent were put on second shift, their school attendance would improve.
   b. Less than 80 percent of the students who were on second shift had a perfect attendance record.
   c. Strict enforcement of attendance rules on that base prevented 20 percent of the students from being absent.

5. Several studies have shown that military recruits from the South make lower scores on the Armed Services Vocational Aptitude Battery than recruits from the North. If recruits who were born in the South moved to the North at a fairly early age, however, their scores were nearly the same as recruits from the North. Therefore, _____.

   a. Southern recruits who move to the North before they can talk will have the same scores on that battery of tests as Northern recruits.
   b. The higher scores of recruits from the North is due to the better schools they attended in the North.
   c. Recruits who are born in the South and stay in the South until they join the military will all score lower on that battery of tests.

6. When Sam entered the military, his posture was poor, he dressed sloppily, had very few friends, was not comfortable around other people, and in general was quite unhappy. A close friend said he should go visit the base chaplain. Sam took this advice, and after 3 months, he carried himself well, dressed better, was more at ease and popular, and in general felt much happier. Therefore, _____.

   a. Had it not been for the chaplain, Sam would not have improved.
   b. Sam's improvement was caused solely by the help given him by the chaplain.
   c. Sam's friend's advice to see the chaplain turned out very well in Sam's case.

STUDENT MOTIVATIONAL SKILL TRAINING:

PRETEST BATTERY INSTRUCTIONS

You have been selected as part of a group of students who will be participating in a research study being conducted by the University of Denver. As part of this study, you are being asked to fill out some questionnaires. Your scores on these measures are being collected for research purposes only. They will not become part of your personnel file and will be kept completely confidential.

Please complete the questionnaires, answering them as honestly as you can. Put your name and today's date on each test form.

Thank you for your cooperation.

Appendix B:

Instructor Training Materials

STUDENT MOTIVATIONAL SKILL TRAINING

Instructor Guidelines

I. Introduction/Orientation

A. Purpose of Motivational Skill Training Program

1. Helping students made the transition from adolescence to adulthood: teaches students how to be good self-managers, how to take charge of their lives and futures, and how to become a responsible adult.

2. Giving students concepts and skills for defining themselves, their values and career goals, and for learning to be independent, responsible, and in control through specific skill training in goal setting, stress management, effective communication, and problem solving strategies.

B. Background of Program

1. Prior research with similar technical training students indicated that students performing poorly lack skills for taking personal responsibility and motivating themselves.

2. Development and evaluation of this program led to the findings that students receiving the motivational skill training, compared to students not receiving the training, had higher block test scores and lower test failure rates; students receiving the training also had higher motivation and involvement in doing well in technical training.

3. Purpose of the current research is to further explore the benefits of this type of skill training, to explore the enhancements possible through the use of computer-assisted instruction (CAI), and to define the appropriate role for the instructor in this type of training.

C. Description of Program

1. Premise: Self-management skills are learned.

2. Format: Consists of the following elements:

   a. Seven printed self-instructional modules of low density with lots of visuals, embedded questions, and practice exercises; modules are consummable.

   b. CAI introductions and practice segments which can be used in lieu of instructor introductions and instructor-led small group practice sessions.

3. Length: Each module takes about 2 hours to read; the entire program is scheduled to be completed in 5 days, at 5 hours per day.

4. Special Features: Each module includes levels of effort, rationale, key words, glossary, objectives, personally relevant case histories and examples, posttest.

5. Module Topics include:

   a. Introduction: Explains the concepts of personal responsibility and positive self-control; introduces students to the basic strategies for taking control of their lives as well as the purpose and organization of the whole program.

   b. Self Knowledge: Helps students explore their values and beliefs, define what is important to them, and resolve value conflicts.

   c. Career Exploration: Helps students explore their career interests and goals and to relate these to their military specialty.

   d. Goal Setting: Helps students learn a systematic approach to setting goals and pursuing them; helps them learn to make decisions.

   e. Stress Management: Helps students understand what stress is and teaches them a variety of do, think, and say strategies for managing stress in their lives.

   f. Effective Communication: Helps students deine their typical communication style and helps them learn how to use effective "I" messages and active listening skills.

   g. Problem Solving: Helps students learn to apply a systematic approach to identifying and solving problems; provides a summary of skills learned in the program.

D. Experimental Conditions

1. Control: Students in each entering class who are not assigned to one of the four experimental conditions; they do not receive the motivational skill training, but do receive the pretest battery, delayed posttests, and are rated by instructors on the instructor questionnaire. (Condition A)

2. CAI Introductions/CAI Practice: Students who are assigned to a version of the motivational skill training wherein they receive CAI introductions to the program and each module, go off and read the printed module on their own, then return to the computer for a CAI practice session. (Condition B)

3. CAI Introductions/Instructor Practice: Students who are assigned to a version of the motivational skill training wherein they receive CAI introductions to the program and each module, go off and read the printed modules on their own, then join an instructor-led small group practice session. (Condition C)

4. Instructor Introductions/CAI Practice: Students who are assigned to a version of the motivational skill training wherein they receive instructor introductions to the program and each module, go off and read the printed module on their own, then go to the computer for a CAI practice session. (Condition D)

5. Instructor Introductions/Instructor Practice: Students who are assigned to a version of the motivational skill training wherein they receive instructor introductions to the program and each module, go off and read the printed module on their own, then join an instructor-led small group practice session. (Condition E)

E. Instructor's Role in Motivational Training (General)

1. Assists students in the learning and application of concepts and skills taught in the motivational program.

2. Monitors student learning under one of the four training methods (Conditions B through E).

3. Administers student measures pre and post motivational training, and delayed posttest measures after students complete the first block of the Electronics Communications course. (See Procedures Chart for Measures.)

4. Administers end-of-module tests to students in Conditions B through E after the practice sessions; scores tests and provides individualized remediation. (See Scoring Keys and instructions.)

5. Fills out instructor questionnaires to evaluate how well each control and experimental student is applying skills at the end of the first course block and at the end of the Electronics Communications course.

6. Fills out Student Data Sheet for each group of students, keeping track of times starting and finishing each introduction and practice session during the motivational training. (See Data Sheet.)

7. Groups completed tests by type and student group; saves tests for collection by research team.

F. Instructor Procedures for Each Training Method

1. CAI Introductions/CAI Practice (Condition B): Instructor briefly explains that students are part of a research study being conducted by the University of Denver to look at the benefits of a special training package; instructor introduces students to the computer, explains in what order they will work through the training program (CAI intros, read modules, CAI practices), and tells students that instructor will be available to answer questions or explain concepts as necessary; instructor will also explain procedures for end-of-module tests (taken at end of practice session, scored by instructor, remediated if necessary).

2. CAI Introductions/Instructor Practice (Condition C): Same as in Condition B, except that the instructor will lead the practice sessions in small groups. During the practice sessions, the instructor will use scripts of characters relevant to each module. Students will not work with the CAI practice sessions.

3. Instructor Introductions/CAI Practice (Condition D): Same as in Conditions B and C, except that the instructor will provide the introductions to the program and each module. During the introduction sessions, the instructor will use scripts of characters relevant to each module. Students will not see the CAI introductions.

4. Instructor Introductions/Instructor Practice (Condition E): Instructor will explain that students are part of a research study as in other conditions and will introduce students to the program and to each module; students will read each module on their own and then participate in instructor-led small group practice sessions. During the introduction and practice sessions, the instructor will use scripts of characters relevant to each module. Students will not see the CAI introductions or practice sessions.

G. Instructor Training Procedures

1. Read seven modules on own, per training schedule.

2. Practice skills in group sessions.

3. Learn procedures for operating computer and for introducing each module and conducting group practice sessions.

Questions and Discussion

Notes:

II. Concepts and Skills in Modules

A. Important Concepts from Program Introduction and Module 1 (Introduction)

1. Introduction to the Student Skills Program

   a. Purpose of Program: How to be a good self-manager, to take charge of your life and future, and to become a responsible adult.

   b. Premise of Program: Self-management skills are learned.

   c. Introduction of Characters/Problems in Each Module: Use of script in describing characters, his/her problem, and how these problems are resolved by applying skills learned in the program.

2. Introduction to Module 1

   a. Rudy's Problem: Introduce through use of script.

   b. Maslow's Hierarchy: Concept of taking responsibility for meeting our own needs.

   c. Self-Fulfilling Prophecy: Concept of how positive or negative attitudes influence positive or negative outcomes; role of self-talk and imagination in changing self-image and performance.

   d. Explanation of Module Format

      Rationale
      Key Words
      Glossary
      Objectives
      Levels of Effort

   e. Explanation of Study Strategies

      Underlining
      Posttests
      Embedded Questions

3. Practice for Module 1

   a. Recap on Rudy: What he learned through use of script.

   b. Self-Talk Practice: Identifying positive and negative self-talk.

   c. Imagination Excerices: Choosing images that help students feel positive in different situations. (Instructor exercise of brainstorming to identify example situations and their corresponding positive images.)

d. Controlling/Changing Bad Attitudes and Beliefs: Importance of students working through a systematic process in changing negative attitudes and irrational beliefs about themselves and their abilities to take positive sel -control. (Instructor exercise of generating meaningful case histories that demonstrate the benefits of a systematic approach.)

Questions and Discussion

Notes:

B. Important Concepts from Module 2 (Self-Knowledge)

1. Introduction to Module 2

   a. Eric's Problem: Introduce through use of script.

   b. Purpose of Module 2: Exploring values as a way of defining yourself and what's important to you; knowing how much of yourself you feel comfortable sharing with others through introduction to Privacy Squares.

   c. Role of Values: Their use in making decisions and setting goals.

   d. Self-Contracting: It's importance as a way to plan changes; concept of making a committment to change.

   e. Types of Values Exercises: Explanation of rank ordering, values continuum, unfinished sentences, are you someone who exercises.

2. Practice for Module 2

   a. Recap on Eric: What he learned through use of script.

   b. Self-Contracting Practice: Use example of Eric's problem.

   c. Sharing Exercise: Discussion of personal examples of why it's important to know yourself.

Questions and Discussion

Notes:

C. Important Concepts from Module 3 (Career Exploration)

1. Introduction to Module 3

   a. Larry's Problem: Introduce through use of script.

   b. Decision Making Process: It's importance and relationship to career decisions.

   c. Self-Directed Search (SDS): Use of the SDS to find career clusters that match personality types and interests; explanation of six job categories (Realistic, Investigative, Artistic, Social, Enterprising, Conventional)

2. Practice for Module 3

   a. Recap on Larry: What he learned through use of script.

   b. Decision Making Steps: Practice identifying steps in the decision making process using case history examples. (Instructor exercise of generating examples.)

   c. Evaluating Good/Bad Decisions: Practice with relevant case histories. (Instructor exercise of generating examples.)

   d. Evaluating Risks and Costs: Practice with case histories. (Instructor exercise of gnerating examples.)

   e. Summary: Importance of investigating and planning in making career decisions; getting the most of current military training.

Questions and Discussion

Notes:

D. Important Concepts from Module 4 (Goal Setting)

1. Introduction to Module 4

   a. Lucy's Problem: Introduce through use of script.

   b. Relationship between Goal Setting and Career Exploration: Importance of systematically setting and planning for short and long term goals.

   c. Importance of Goals: Their function in motivating individuals to make changes identified in Modules 2 and 3.

   d. Goal Setting Skills: Use of questioning, imagination, positive self-talk, brainstorming, and self-rewards in putting plans into action.

2. Practice for Module 4

   a. Recap on Lucy: What she learned through use of script.

   b. Identifying Good/Bad Goal Statements: Practice with examples. (Instructor exercise of generating examples.)

   c. Evaluating Alternatives: Practice evaluating alternative plans for achieving goals from examples. (Instructor exercise of generating goals and alternative plans.)

   d. Identifying Good Rewards: Practice identifying good rewards for specific situations. (Instructor exercise of generating situations and possible rewards.)

Questions and Discussion

Notes:

E. Important Concepts from Module 5 (Stress Management)

1. Introduction to Module 5

   a. David's Problem: Introduce through use of script.

   b. Signs of Stress: Go over list in module and discuss four factors that determine how much stress a person feels.

   c. Role of Perceptions and Mistaken Beliefs: Concept that stress is many times caused by mistaken beliefs that distort perceptions and cause feelings of anger or anxiety.

   d. Stress Management Strategies: Introduce types of do, think, and say strategies students will be learning.

   e. Relaxation Tape: Play tape for students.

2. Practice for Module 5

   a. Recap on David: What he learned through use of script.

   b. Identifying Mistaken Beliefs: Practice with case histories. (Instructor exercise of generating 4-5 case histories.)

   c. Countering Mistaken Beliefs: Practice with same case histories used above.

   d. Using the Worksheets: Practice filling out from examples; emphasize importance of monitoring stressful situations.

Questions and Discussion

Notes:

F. Important Concepts from Module 6 (Effective Communication)

1. Introduction to Module 6

   a. Kris and Scott's Problems: Introduce through use of scripts.

   b. Communication Styles: Introduce styles of aggressive, non-assertive, and assertive and concept of basic rights in helping us to be responsibly assertive.

   c. Effective Communication Skills: Introduce types of listening and talking skills students will learn and why these are important in achieving goals.

   d. Identifying and Communicating Feelings: Concept that what is said and the way it's said influence our feelings and reactions.

2. Practice for Module 6

   a. Recap on Kris and Scott: What they learned through use of scripts.

   b. Identifying Communication Styles: Practice with case histories. (Instructor exercise of generating case histories.)

   c. Identifying Feelings: Practice with specific messages. (Instructor exercise of generating examples.)

   d. Generating Responses to Difficult Situations: Practice with accepting criticism, saying 'no', expressing anger. (Instructor exercise of generating situations in these categories.)

   e. Using the Worksheets: Practice filling out from examples. Discuss why this practice is important.

Questions and Discussion

Notes:

G. Important Concepts from Module 7 (Problem Solving)

1. Introduction to Module 7

   a. Summary of Each Character: What they learned (from scripts) and how all these relate to problem solving.

   b. Problem Solving Steps and Skills: Overview of process and skills involved (questioning, brainstorming, imagination, self-talk).

   c. Importance of Using a Systematic Process: Show how this helps with examples of Hugh and Angela from scripts.

2. Practice for Module 7

   a. Recap on Hugh and Angela: How the problem solving process helped and the importance of planning.

   b. Defining the Problem: Practice with case history. (Instructor exercise of generating appropriate case history.)

   c. Generating and Evaluating Alternatives: Practice with same case history as above.

   d. Making an Implementation Plan: Practice with same case history.

   e. Implementing and Evaluating the Plan: Practice with same case history which exemplifies how to handle setbacks.

   f. Summary: Discussion of how all the skills work together; reminder to practice skills and refer back to modules.

Questions and Discussion

Notes:

Measures	A. Control (No skill training)	B. CAI Intro/ CAI Practice	C. CAI Intro/ Instructor Practice	D. Instructor Intro/CAI Practice	E. Instructor Intro/Instructor Practice
Pretest Battery (Orientation Day)	Yes	Yes	Yes	Yes	Yes
End-of-Module Tests (During Training)	No	Yes	Yes	Yes	Yes
Delayed Posttest (End of First Course Block)	Yes	Yes	Yes	Yes	Yes
Instructor Questionnaire (End of First Course Block & End of Course)	Yes	Yes	Yes	Yes	Yes

PROCEDURES CHART: Skill Training

Introduce Major Concepts before Each Module	No	No	No	Yes	Yes
Monitor Students; Answer Questions	No	Yes	Yes	Yes	Yes
Conduct Small Group Practice at End of Each Module	No	No	Yes	No	Yes
Remind Students to Use Skills After Training	No	Yes	Yes	Yes	Yes

APPLE IIe Instructions

System Start-Up

1. Insert appropriate audio cassette. Check to be sure tape is rewound to the beginning. If tape is not rewound, follow rewinding instructions in next section.

2. Insert appropriate diskette into disk drive per the instructions in the third section.

3. Turn on computer and monitor. The switch for the computer is on the back left hand side of the computer. The switch for the monitor is on the lower right front of the screen.

4. Press "PLAY" button on the audio cassette player.

5. Put head phones on.

6. Follow instructions on computer screen.

System Shut-Down

1. Press "STOP" button on audio cassette player after the computer has stopped the tape.

2. Pull out "REMOTE" plug (the smaller one) from audio cassette player, press the "REWIND" button, and rewind audio cassette tape to the beginning. When tape is rewound, press "STOP" button.

3. Reinsert the "REMOTE" plug into the audio cassette player and turn off the computer and monitor.

4. Remove audio cassette tape and diskette. Return to your instructor.

Care of Diskettes

1. General Handling

   a. Never touch the exposed magnetic portions of the diskettes.

   b. Store diskettes in envelopes at all times. Remove from envelope only to insert in disk drive.

   c. Although diskettes are made of flexible material, they should never be bent or folded.

2. Inserting Diskettes

   a. Computer should be "off" when inserting diskettes into disk drive.

   b. Open disk drive door by lifting up.

c. Remove diskette from storage envelope.

d. Insert diskette with label up and notch on lower left side.

e. Slide diskette into drive. If it does not slide in smoothly, do not force it. Simply pull it out and try again.

f. Close disk drive door.

g. Caution: Never insert or remove diskettes when the red disk drive light is on.

3. Removing Diskettes

a. Turn computer off.

b. Open disk drive door.

c. Remove diskette, holding it by the label.

d. Insert diskette in storage envelope.

Diskette and Audio Tape Labeling

Note: There are ten sets of both the diskettes and audio tapes. They are labeled and organized as shown below.

Diskettes

(1) Red Labels - Diskette #1

Intro to Program
Intro and Practice for Module 1

(2) Blue Labels - Diskette #2

Intro and Practice for Modules 2 and 3

(3) Yellow Label - Diskette #3

Intro and Practice for Modules 4 and 5

(4) Green Labels - Diskette #4

Intro and Practice for Modules 6 and 7

Audio Tapes

(1) Audio Tape #1

Side 1 - Intro to Program, Intro to Module 1
Side 2 - Practice for Module 1

(2) Audio Tape #2

Side 1 - Intro to Module 2
Side 2 - Practice for Module 2

(3) Audio Tape #3

Side 1 - Intro to Module 3
Side 2 - Practice for Module 3

(4) Audio Tape #4

Side 1 - Intro to Module 4
Side 2 - Practice for Module 4

(5) Audio Tape #5

Side 1 - Intro to Module 5
Side 2 - Practice for Module 5

(6) Audio Tape #6

Side 1 - Intro to Module 6
Side 2 - Practice for Module 6

(7) Audio Tape #7

Side 1 - Intro to Module 7
Side 2 - Practice for Module 7

STUDENT MOTIVATIONAL SKILL TRAINING

PURPOSE OF PROGRAM

This seven module program is designed to give students personalized training in those strategies and skills that can help them learn to take control of their lives. The program teaches students how to define what is important to them, to identify career interests and goals, to set short and long term goals, to manage stress, to communicate effectively with others, and to solve problems. In short, the program helps students to motivate themselves by being good self-managers.

PROGRAM FORMAT

The main content of the motivational skill training program is presented in self-contained, easy to read printed modules. Each module has been formatted to include a statement of the rationale or purpose of each module, a statement of objectives, embedded questions and practice exercises, an opportunity for students to chose a level of effort for learning each module, key words and an accompanying glossary, and personally relevant case histories and examples. A posttest follows each module and allows students the opportunity to test themselves over key concepts and skills.

The program and each module are designed to be introduced by an instructor or by a computer-assisted instruction (CAI) program. Following this introduction, students read through each module on their own. When they finish each module, students then take the module posttest and participate in either an instructor-led small group discussion/practice session or they receive a CAI practice/simulated group experience.

BENEFITS OF PROGRAM

The motivational skill training program has been shown to improve students' test scores and to reduce test failure rates. The Army is interested in further exploring the benefits of this type of skill training as well as in exploring the enhancements possible through the use of CAI.

PURPOSE OF EACH MODULE

INTRODUCTION: Explains the concepts of personal responsibility and positive self-control; introduces students to the basic strategies for taking control of their lives as well as the purpose and organization of the whole program.

SELF KNOWLEDGE: Helps students explore their values and beliefs, define what is important to them, and resolve values conflicts.

CAREER EXPLORATION: Helps students explore their career interests and goals and to relate these to their military specialty.

GOAL SETTING: Helps students learn a systematic approach to setting goals and pursuing them; helps them learn to make decisions.

STRESS MANAGEMENT: Helps students understand what stress is and teaches them a variety of do, think, and say strategies for managing stress in their lives.

EFFECTIVE COMMUNICATION: Helps students define their typical communication style and helps them learn how to use effective "I" messages and active listening skills.

PROBLEM SOLVING: Helps students learn to apply a systematic approach to identifying and solving problems; provides a summary to the program.

STUDENT HANDOUTS

Module 1 - Introduction

No Handouts

Module 2 - Self Knowledge

Contract Form (for CAI Practice)

Module 3 - Career Exploration

Handout #1 - Decision Making Process (for CAI Practice)
Handout #2 - Evaluating Risks and Costs (for CAI Practice)

Module 4 - Goal Setting

Game Instructions (for CAI Introduction)

Module 5 - Stress Management

Handout #1 - Mistaken Beliefs (for CAI Practice)
Handout #2 - Worksheet (for CAI Practice)

Module 6 - Effective Communication

Worksheet (for CAI Practice)

Module 7 - Problem Solving

Handout #1 - Defining the Problem (for CAI Practice)
Handout #2 - Generating and Evaluating Alternatives (for CAI Practice)

Appendix C:

Student Assignment Sheet

Condition:_____ Class #:_____

B=CAI Intro & Prac
C=CAI Intro/Instr Prac
D=Instr Intro/CAI Prac
E=Instr Intro & Prac

STUDENT ASSIGNMENT SHEET

EXPERIMENTAL				CONTROL			
NAME	SSN	RANK	SEX	NAME	SSN	RANK	SEX
Regular Army				1.			
1.				2.			
2.				3.			
3.				4.			
4.				5.			
5.				6.			
6.				7.			
7.				8.			
8.				9.			
9.				10.			
National Guard				11.			
1.				12.			
2.				13.			
3.				14.			
4.				15.			
Reserve				16.			
1.				17.			
2.				18.			
				19.			
				20.			
				21.			
				22.			
				23.			
				24.			
				25.			

ASSIGNMENT RULES: Please assign 2 females to the experimental group if possible. Try to achieve the mix of regular Army, National Guard, and Reserve shown above. If this isn't possible, try to balance between experimental and control groups. Indicate the component for students assigned to the control condition. For class sizes smaller than 35 students, use the following rules:

	Total Class Size	# Assigned to Experimental	# Assigned to Control
IF:	21 or more	15 students	Remainder of Class
	10-20	10 students	Remainder, if any
	9 or less	All	None

Appendix D:

Descriptive Statistics for Noncategorical Variables by Experimental Group

The following information is offerred to aid in interpretation of the data. For the following variables, high scores are desirable. ASVAB General, ASVAB Electrical, ASVAB Clerical, Critical Thinking Pre- and Posttests, Self-Efficacy Pre- and Posttest, and Instructor Rating.

For the folowing set of variables, low scores reflect desirable attributes or results: Pre- and Posttest measures of adaptation, frustration, overload, deprivation, nutrition, self-perception, type A behavior, and anxiety; test failures; time to complete tasks; and Progress Index.

Appendix D

Descriptive Statistics for Noncategorical Variables by Group

Variable	Group	N	$\bar{X}$	SD	Correlation with Progress Index
ASVAB General	CC	144	105.9	11.76	
	CAI	36	105.0	9.52	
	CAII	21	107.5	13.01	
	ICAI	34	108.6	13.61	
	II	31	107.9	9.51	
	Total	266	106.5	11.58	.204**
ASVAB Electrical	CC	144	108.0	9.36	
	CAI	36	106.6	10.35	
	CAII	21	109.2	11.29	
	ICAI	34	110.9	12.59	
	II	31	110.5	9.12	
	Total	266	108.6	10.10	.321**
ASVAB Clerical	CC	105	102.2	12.38	
	CAI	21	101.8	9.55	
	CAII	13	103.6	17.80	
	ICAI	9	104.3	14.51	
	II	11	101.6	11.13	
	Total	159	102.4	12.47	.197**
Critical Thinking Pretest	CC	159	2.75	1.08	
	CAI	36	3.14	1.29	
	CAII	44	2.86	1.17	
	ICAI	40	2.85	1.31	
	II	43	3.00	1.13	
	Total	322	2.86	1.15	.108

(continued)

Descriptive Statistics for Noncategorical Variables by Group (continued)

Variable	Group	N	$\bar{X}$	SD	Correlation with Progress Index
Self-Efficacy Pretest	CC	172	93.4	11.69	
	CAI	36	91.1	13.56	
	CAII	45	94.7	11.69	
	ICAI	39	94.4	12.94	
	II	46	95.5	12.41	
	Total	338	93.7	12.13	.107
Adaptation Pretest	CC	173	214.7	107.7	
	CAI	36	220.2	129.0	
	CAII	46	215.2	101.4	
	ICAI	40	217.7	128.0	
	II	46	179.1	96.6	
	Total	341	210.9	110.5	.003
Frustration Pretest	CC	172	24.59	4.14	
	CAI	36	24.17	3.84	
	CAII	45	24.76	3.69	
	ICAI	40	24.15	4.15	
	II	46	22.91	4.54	
	Total	339	24.29	4.13	.034
Overload Pretest	CC	173	19.45	3.65	
	CAI	36	20.83	4.03	
	CAII	45	20.44	3.91	
	ICAI	40	19.68	4.19	
	II	46	18.98	3.92	
	Total	340	19.69	3.85	.156*

(continued)

Descriptive Statistics for Noncategorical Variables by Group (continued)

Variable	Group	N	$\bar{X}$	SD	Correlation with Progress Index
Anxiety Pretest	CC	168	22.24	5.92	
	CAI	35	23.26	5.71	
	CAII	44	21.45	5.27	
	ICAI	39	22.82	5.57	
	II	46	21.11	6.61	
	Total	332	22.16	5.88	.055
Critical Thinking Posttest	CC	169	3.04	1.13	
	CAI	46	2.97	1.11	
	CAII	45	3.22	1.02	
	ICAI	39	3.46	1.14	
	II	46	3.20	1.05	
	Total	345	3.12	1.10.	0.55
Self-Efficacy Posttest	CC	175	93.8	11.47	
	CAI	46	92.5	13.56	
	CAII	46	94.0	11.75	
	ICAI	40	93.3	12.53	
	II	46	94.9	12.23	
	Total	353	93.8	11.96	.065
Adaptation Posttest	CC	174	201.3	109.9	
	CAI	46	245.5	117.0	
	CAII	46	222.7	103.8	
	ICAI	40	236.1	140.4	
	II	46	223.1	128.9	
	Total	352	216.7	117.0	.061

(continued)

Descriptive Statistics for Noncategorical Variables by Group (continued)

Variable	Group	N	$\bar{X}$	SD	Correlation with Progress Index
Deprivation Pretest	CC	172	23.98	4.52	
	CAI	36	23.19	5.13	
	CAII	45	23.87	5.55	
	ICAI	40	24.43	4.18	
	II	46	22.85	4.54	
	Total	339	23.78	4.69	.004
Nutrition Pretest	CC	172	15.19	2.28	
	CAI	36	16.33	3.12	
	CAII	44	15.07	2.62	
	ICAI	40	14.95	1.83	
	II	46	15.41	2.08	
	Total	338	15.30	2.37	.006
Self-Perception Pretest	CC	172	18.60	4.02	
	CAI	36	19.31	5.21	
	CAII	45	17.64	4.06	
	ICAI	39	18.56	4.01	
	II	46	17.26	4.88	
	Total	338	18.36	4.30	.143*
Type A Behavior Pretest	CC	171	23.76	4.60	
	CAI	36	24.17	4.55	
	CAII	45	23.09	4.88	
	ICAI	40	23.15	4.73	
	II	46	23.26	4.05	
	Total	338	23.57	4.56	.064

(continued)

Descriptive Statistics for Noncategorical Variables by Group (continued)

Variable	Group	N	$\bar{X}$	SD	Correlation with Progress Index
Frustration Posttest	CC	175	23.98	4.82	
	CAI	46	25.28	4.18	
	CAII	46	24.91	4.10	
	ICAI	40	23.93	4.46	
	II	46	24.63	5.17	
	Total	353	24.35	4.66	.019
Overload Posttest	CC	175	18.79	3.56	
	CAI	46	20.50	4.34	
	CAII	46	19.52	4.46	
	ICAI	40	19.50	3.87	
	II	46	18.74	4.57	
	Total	353	19.18	3.99	.068
Deprivation Posttest	CC	174	23.48	4.62	
	CAI	46	23.35	4.54	
	CAII	45	23.09	4.63	
	ICAI	40	23.58	4.43	
	II	46	22.24	5.08	
	Total	351	23.26	4.64	.039
Nutrition Posttest	CC	174	15.03	2.41	
	CAI	46	14.96	2.16	
	CAII	46	14.96	2.67	
	ICAI	40	14.75	1.79	
	II	46	15.07	2.26	
	Total	352	14.98	2.32	.116

(continued)

Descriptive Statistics for Noncategorical Variables by Group (continued)

Variable	Group	N	$\bar{X}$	SD	Correlation with Progress Index
Failures on Tasks 1-16	CC	175	1.22	1.23	
	CAI	46	1.43	1.24	
	CAII	46	.93	1.25	
	ICAI	40	1.18	1.30	
	II	46	.98	1.22	
	Total	353	1.18	1.24	.311**
Time to Complete Tasks 1-16	CC	175	111.67	22.18	
	CAI	47	110.06	20.59	
	CAII	46	106.96	24.56	
	ICAI	40	110.40	27.31	
	II	46	103.54	22.39	
	Total	354	109.65	23.00	.706**
Failures on Tasks 17-26	CC	175	1.65	1.43	
	CAI	47	1.81	1.78	
	CAII	46	1.33	1.23	
	ICAI	40	2.05	2.04	
	II	46	1.41	1.18	
	Total	354	1.64	1.51	.325**
Time to Complete Tasks 17-26	CC	175	213.92	38.56	
	CAI	47	222.72	37.49	
	CAII	46	211.46	37.39	
	ICAI	40	214.95	40.50	
	II	46	201.35	37.44	
	Total	354	213.25	38.54	.870**

(continued)

Descriptive Statistics for Noncategorical Variables by Group (continued)

Variable	Group	N	$\bar{X}$	SD	Correlation with Progress Index
Total Test Failures	CC	175	2.87	1.98	
	CAI	46	3.17	2.31	
	CAII	46	2.26	2.08	
	ICAI	40	3.23	2.68	
	II	46	2.39	1.86	
	Total	353	2.81	2.10	.318**
Progress Index	CC	175	.913	.122	
	CAI	47	933	.116	
	CAII	46	.902	.120	
	ICAI	39	.915	.124	
	II	46	.868	.129	
	Total	353	.909	.123	1.00